

**annual
report
2010**

cooper
ing schools
scientific missions
strategic workshops
human potential

The year in review



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This Annual Report highlights the achievements of the Actions that ended in 2010. The impact of each of these Actions is of the most diverse nature and will become visible at different points in the future. But what is more important, each and every Action has created a community with cohesive research activities leading to unexpected novel ideas and common wisdom

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I am happy to present the Annual Report 2010, my first since I was elected President of the COST Committee of Senior Officials (CSO) in spring 2010 in Riga.

In 2010 COST's added value and role as an active player in the European Research Area was reaffirmed during the dedicated Ministerial Conference which took place under the EU Spanish Presidency in Mallorca.

Since 1971 COST has connected over 30 000 researchers in Europe and beyond through networks in all fields of Science and Technology.

Indeed, COST allows free and open thinking, builds on knowledge sharing that will develop into smart, sustainable and inclusive societies of tomorrow. COST also paves the way for identifying and tackling emerging risks through ground breaking research approaches leading to new concepts and outputs.

This Annual Report highlights the achievements of the Actions which ended in 2010. The impact of each of these Actions is of the most diverse nature and will become visible at different points in the future. But what is more important, each and every Action has created a community with cohesive research activities leading to unexpected novel ideas and common wisdom.

In 2011 COST celebrates its 40th anniversary and has decided to make use of this opportunity by taking a great leap forward; to streamline its procedures and implement the results of its activities more rapidly. Our objective is to place COST in the spotlight in order to expose the full potential of the framework's achievements and contributions.

Dr Ángeles Rodríguez-Peña

President of the COST Committee of Senior Officials

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COST 2010 Ministerial Declaration in a nutshell



COST must continue and develop as a European initiative and as a mechanism of prime importance for the strengthening of the ERA

COST Activities will have a continued added value in future



COST succeeds in being a **flexible, fast and efficient tool** to network and coordinate research activities, under light strategic guidance

The European Union must maintain a strong and active involvement in all aspects of COST

COST must strengthen its role as an active player in the ERA, within its European and global dimension

Representatives of the governments of the COST Member States and of the European Commission reaffirm their commitment to COST and undertake to fully exploit COST's potential



COST contributes to Europe's competitiveness and socio-economic development and to overcoming the fragmentation of the ERA





Biomedicine and Molecular Biosciences (BMBS)

The BMBS Domain covers all areas of medicine as practiced in Europe and basic, preclinical and clinical medical research developed to materialise the “bench to bedside” concept. Research in biomedicine emphasises acquisition of knowledge of normal functions of the human body and alterations of them in the case of diseases. Research topics range from the molecular level up to a systemic analysis of whole body functions, not excluding its integration in the environment (food, water supply, pollutants, forests, urban environment, etc.).

Domain website:
<http://www.cost.eu/bmbs>

Domain Committee Chair:
Prof. Roland Pochet

COST Office Science Officer:
Dr Magdalena Radwanska
bmbs@cost.eu

BMBS running Actions



Obstructive Sleep Apnea COST Action B26

Over 7000 patients were enrolled in the database by the end of the Action.

This Action created the first major initiative dedicated to Obstructive Sleep Apnea Syndrome (OSAS) at the European level:

- promoting exchanges between European research groups on diagnosis and management;
- addressing medical and legal implications of OSAS and sleepiness;

- facilitating the establishment of a large **Network of Sleep Centres** throughout Europe which has encouraged the implementation of common standards and procedures for clinical practice and research;
- establishing common protocols for clinical and basic research projects;
- providing comprehensive European guidelines for diagnosis and treatment of OSAS.

The Action increased understanding of the role of OSAS as a cause of **cardiovascular co-morbidity**, and coordinated European studies on pathogenesis mechanisms including genetic aspects.

A large-scale European study of OSAS (ESADA, the European Sleep Apnea Database) was established which contained uniform and standardised details on a large cohort of patients suspected of OSAS.



The overriding success of the Action was the establishment of European guidelines on the management of patients with OSAS and Hypertension in collaboration with the European Respiratory Society and the European Society of Hypertension.
website: <http://www.cost.eu/library/publications/10-46-European-Consensus-Document-on-OSA-and-Hypertension>

Chair of the Action: Prof. Walter McNicholas (IE)

Vice Chair of the Action: Prof. Patrick Levy (FR)

Duration of the Action: 2005 – 2010

Parties: Austria, Belgium, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Latvia, Lithuania, Poland, Portugal, Serbia, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom (Total 24)

Action website: <http://www.cost.eu/bmbs/Actions/B26>

Array Technologies for BSL3 and BSL4 Pathogens

COST Action B28

Publication:

Detection of Highly Dangerous Pathogens: Microarray Methods for BSL3 and BSL4 Agents.

The Action focused on:

- the development of microarrays;
- research studies on antigenicity, proteomics, glycomics and genomics with the support of microbiology knowledge and capacities.

At the global scale, all microorganisms that can be used as biological weapons have been taken into account; the **emphasis was on the development of various detection tools**. The Action gathered multiple partners with expertise in microbiology, immunology, biochemistry, molecular biology and microtechnology.

One of the Action's scientific breakthroughs was the development of a **surface plasma resonance based microarray**.



Further successes include:

- the development of both new and improved diagnostic/detection tools;
- an increased global knowledge of targeted microorganisms;
- the provision of multiple training schools on BSL3/BSL4 pathogens and courses on e.g. proteomics.

The main outcome of the Action was an increase in knowledge of BSL3 and BSL4 agents which supports the development of more accurate diagnostics, vaccines and therapeutic means and which furthers the understanding of the epidemiology of these pathogens.

Chair of the Action: Prof. Patrick Butaye (BE)

Vice Chair of the Action: Dr Rudolf Toman (SK)

Duration of the Action: 2005 – 2010

Parties: Austria, Belgium, Bulgaria, Czech Republic, Denmark, France, Germany, Greece, Italy, Luxembourg, Netherlands, Portugal, Romania, Serbia, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom (Total 20)

Action website: <http://www.cost.eu/bmbs/Actions/B28>



Neural Regeneration and Plasticity (NEREPLAS)

COST Action B30

The efforts of this Action focused on the determination of the **neuronal repair features involving regeneration and plasticity** after injury or damage. The Action also assessed the role of regeneration and plasticity in **neurodegenerative diseases**, thus combining the basic neurobiology with clinical studies.

There are numerous conclusive results of this Action.

- The Action increased the knowledge on the neuronal processes underlying functional recovery following traumatic, ischemic or degenerative damage of the nervous system, and their relationship with those neural processes involved in **motor and cognitive learning**.
- The Action contributed to the elucidation of basic neurobiology aspects of the regeneration and plasticity - combining the genetic and cellular studies with imaging techniques.
- Many young researchers receiving training in different laboratories.
- Several joint papers were published in conjunction with this Action.
- European Framework grants were obtained as a result of joint activities and networking promoted by this Action.

The **most significant result** of this Action was the creation of a network of more than 60 European laboratories devoted to the study of brain plasticity and regeneration capabilities.

Chair of the Action: Prof. Jose M. Delgado-Garcia (ES)

Vice Chair of the Action: Prof. Pierre-Paul Vidal (FR)

Duration of the Action: 2006 – 2010

Parties: Austria, Belgium, Croatia, Cyprus, Czech Republic, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Israel, Italy, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovak Republic, Slovenia, Spain, Sweden, Turkey, United Kingdom (Total 24)

Non-COST institution participation from the Bogomoletz Institute of Physiology (UA) and the Ilia Chavchavadze State University (GE).

Action website: <http://www.nereplas.eu/> and <http://www.cost.eu/bmbs/Actions/B30>

Lipid Peroxidation Associated Disorders: LPO

COST Action B35

New journal:

Clinical and Experimental Medical Journal:
http://akkrt.hu/32/journals/products/medicine/clinical_and_experimental_journal_eng

The Action improved the understanding, monitoring and control of lipid peroxidation in medicine and related biosciences and technologies.

The new Clinical and Experimental Medical Journal was launched as the international successor of the Hungarian journal Orvosi Hetilap as a direct output of this Action. Furthermore, the Action resulted in:

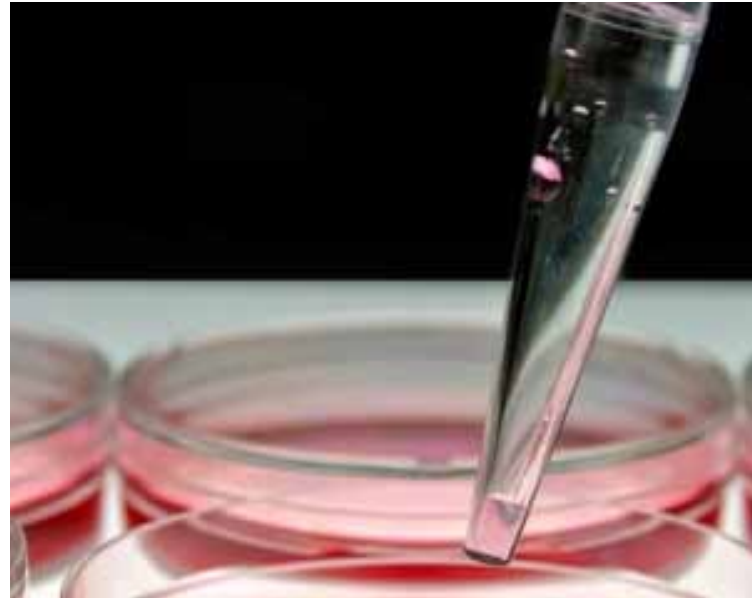
- improved methods of detecting and quantifying lipid peroxidation for use in research and subsequent application (through biotechnology) to clinical science;
- determining the prevalence of lipid peroxidation products in various inflammatory diseases and its **correlation to disease severity or outcome**;
- defining **antioxidants as modifiers of biological responses**, pointing out the beneficial effects of mild stress (such as physical exercise) and denoting lipid peroxidation as fundamental mechanisms of hormesis.

A defining result of the Action was the evaluation and validation of various novel antioxidants in relation to possible future applications in inflammatory disease therapy.

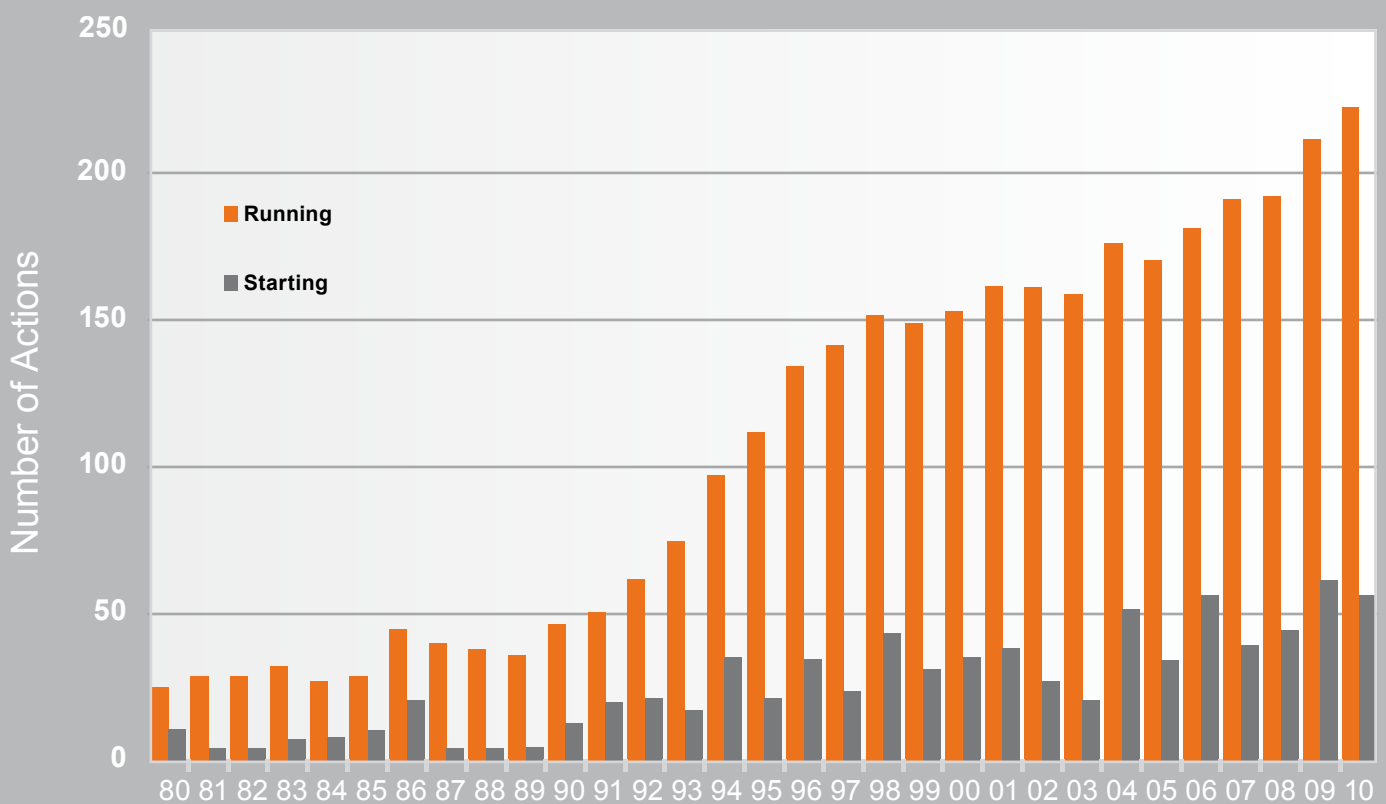




Chair of the Action: Prof. Nevin Zarkovic (HR)
Vice Chair of the Action: Prof. Tilman Grune (DE)
Duration of the Action: 2006 – 2010
Parties: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Israel, Italy, Latvia, Lithuania, Norway, Poland, Portugal, Romania, Serbia, Slovak Republic, Spain, Turkey, United Kingdom (Total 25)
 Non-COST institution participation from the Department of Internal Medicine #1, Department of Endocrinology, National Medical University of Lviv (Lvov) (UA).
Action website: <http://www.irb.hr/en/research/projects/intl/euprojects/costb35/> and <http://www.cost.eu/bmbs/Actions/B35>



COST evolves – The number of starting and running Actions since 1980



An exhaustive overview of the COST Actions is available on http://www.cost.eu/domains_actions/all_actions



Chemistry and Molecular Sciences and Technologies (CMST)

The CMST Domain has the mission to foster European expertise in discovering, understanding, producing and manipulating molecular species. The research activities in this Domain aim to develop experimental, theoretical and analytical tools to enhance the development of chemical transformations, reactivity and function. CMST aims to apply such knowledge and innovation to industrial processes and production.

Domain website:
<http://www.cost.eu/cmst>

Domain Committee Chair:
Prof. Dieter Schinzer

COST Office Science Officer:
Dr Lucia Forzi
cmst@cost.eu

CMST running Actions



Molecular Targeting and Drug Design in Neurological and Bacterial Diseases COST Action D34

Molecular targeting covers drug design, both on the basis of mechanistic studies and of structural studies of the molecules.

The main objective of the Action was to build on existing knowledge at the chemistry/biology interface, in order to develop new **target oriented molecules and classes of molecules** with therapeutic applications in the area of bacterial and neurological diseases.

The Action focused on the design of new candidate drugs and their subsequent biological evaluation. The activities were divided into two areas: Drug targeting in **bacterial diseases** and drug targeting in **neurological diseases**.

The cooperative interaction of the research groups of the Action resulted in the development of:

- dendrimeric ligands with strong affinity towards cholera toxin receptors and lectins involved in *Pseudomonas Aeruginosa* infections;
- taurine analogues able to cross the cell membranes;
- metal chelators performing a protective action against oxidative damage involved in neurodegeneration.

The **main achievements** of the Actions were in terms of synthesis of new therapeutics and their biological testing using cell culture and animal models.

Benefits of this interdisciplinary approach led to experts in different fields joining forces and finding solutions to problems which would not have been possible within a single discipline and without this COST Action.



Chair of the Action: Dr Robert R. Crichton (BE)
Vice Chair of the Action: Dr Anne-Marie Albrecht-Gary (FR)
Duration of the Action: 2005 – 2010
Parties: Austria, Belgium, Czech Republic, France, Germany, Greece, Ireland, Israel, Italy, Latvia, Lithuania, Netherlands, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Switzerland, United Kingdom (Total 20)
Action website: <http://www.cost.eu/cmst/Actions/D34>

Grid Computing in Chemistry: GRIDCHEM COST Action D37

Publication:
 COST Action D37 Grid Computing in
 Chemistry: GRIDCHEM - Final Scientific
 Report

The main objective of the Action was to facilitate the creation and use of distributed computing infrastructures (Grids) in chemistry. The principal goal was to bring **computer modelling and simulation in chemistry** to new frontiers in complexity and to a new regime of time-to-solution.

The Action had a very strong technical component in its agenda and its focus was on:

- classical Grid computing/quantum dynamics;
- program interoperability and data exchange formats;
- workflows and data archival;
- e-science and learning technology;
- large scale hybrid dynamics using a Grid infrastructure.

Contributions, as a direct result of the Action include the development of:

- common distributed infrastructures;
- unified middleware;
- interoperable software;
- cooperative working;
- workflows and gateways;

- virtual research communities for the advancement of molecular sciences and technologies.

The **most important outcome** of the Action is that the chemistry community can now play an equal role with the most advanced scientific communities at the European Grid Infrastructure (EGI); allowing them to leverage on grid technologies in order to make significant progress on accurate realistic simulations.

Chair of the Action: Prof. Hans Peter Luthi (CH)
Vice Chair of the Action: Dr Thomas Steinke (DE)
Duration of the Action: 2006 – 2010
Parties: Austria, Bulgaria, Croatia, Czech Republic, Denmark, France, Germany, Greece, Hungary, Israel, Italy, Lithuania, Netherlands, Norway, Poland, Spain, Sweden, Switzerland, United Kingdom (Total 19)
Action website: <http://www.cost.eu/cmst/Actions/D37>

Inorganic oxides – surfaces and interfaces COST Action D41

TiO₂ is used in new generation solar cells, and as a photocatalyst in self-cleaning processes. Therefore, the research on these systems has a direct impact on relevant topics such as energy production and environmental control or pollution reduction.

Metal oxides play a very important role in many areas of chemistry, physics, materials science and nanotechnology. They are used in the fabrication of microelectronic circuits, chemical sensors, piezoelectric devices, coatings for corrosion protection or thermal isolation, heterogeneous and environmental catalysis, bio-compatible materials, magnetic devices, fuel cells, etc. Many of their properties are related to surface and interface structure.

The main objective of this Action was the **microscopic understanding at the atomistic level of oxide surfaces and interfaces**. This is of fundamental importance for the development of new materials, nanostructures and novel devices.



The Action activity was directed at:

- the elucidation of phenomena occurring at the surface and interface of oxide materials, more than on possible technological applications;
- the knowledge of the behaviour of oxide surfaces and their chemical reactivity, in order to improve the heterogeneous catalytic behaviour of such materials.

Two key success stories:

1. A key aspect of modern technologies is the possibility to generate hydrogen from the splitting of water using solar light and efficient photocatalysts; of these, titanium dioxide TiO_2 and doped titanium dioxide TiO_2 are considered the most promising materials. This subject has the potential to have a strong socio-economic impact in the medium term as it could revolutionise the way hydrogen is produced. The goal is to improve the performance of these systems: Increased photocatalytic activity through doping and nanostructuring has been one of the central methods discussed within this Action.
2. A second scientific breakthrough was the discovery of the specific role that ultrathin oxide films, consisting of a few atomic layers, have in various fields of science and technology. These systems govern phenomena like corrosion protection, microelectronics and spintronics, and have a relevant role in oxidative catalysis by metals.

Chair of the Action: Prof. Gianfranco Pacchioni (IT)

Vice Chair of the Action: Dr Thomas Risse (DE)

Duration of the Action: 2006 – 2010

Parties: Austria, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Italy, Lithuania, Poland, Portugal, Romania, Serbia, Spain, Sweden, Switzerland, United Kingdom (Total 19)

Non-COST institution participation from the University of Adelaide (AU).

Action website: <http://www.cost-d41.unimib.it/> and <http://www.cost.eu/cmst/Actions/D41>

Chemical Interactions between Cultural Artefacts and Indoor Entertainment (EnviArt)

COST Action D42

Publication:

Basic Environmental Mechanisms Affecting Cultural Heritage: Understanding deterioration mechanisms for conservation purposes

The Action explored chemical interactions between cultural artefacts and typical indoor environmental conditions and translated the results into preventive conservation practices.

The indoor environment consists of components capable of deteriorating our cultural artefacts; components coming from **both outdoor and indoor air**. Of the indoor components, even historical objects contribute to the environment as they often emit components that might be harmful to other objects.

This Action created the opportunity for chemists and material scientists working in the field of preventive conservation to exchange knowledge with museum staff and decision makers; thereby contributing to an **important aspect of the European identity**, i.e. the preservation of cultural heritage.

In addition, the Action contributed to:

- establishing guidelines for indoor air quality in museums, archives and libraries;
- the development of new initiatives and novel analytical techniques;
- an increased scientific knowledge of the natural aging process of historic materials (especially in indoor environments);
- an increase in cooperation in the field.

The safeguarding of heritage materials is not confined to the realm of conservation and restoration - it relies on science and technology to understand necessary processes and to develop novel methods.

A **key result** of this Action is the development of an important area of fundamental science in analytical chemistry; a support for the development and conservation artisan and SME skills and working activities.



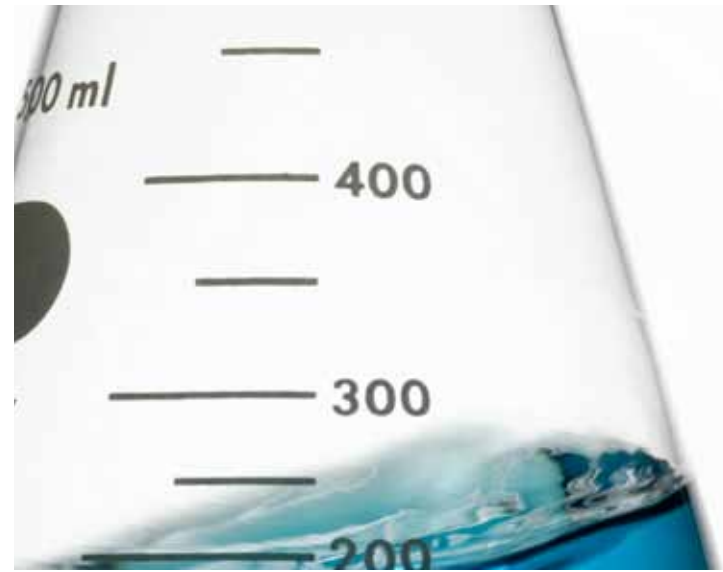
Chair of the Action: Dr John Havermans (NL)
Vice Chair of the Action: Prof. Annemie Adriaens (BE)

Duration of the Action: 2006 – 2010

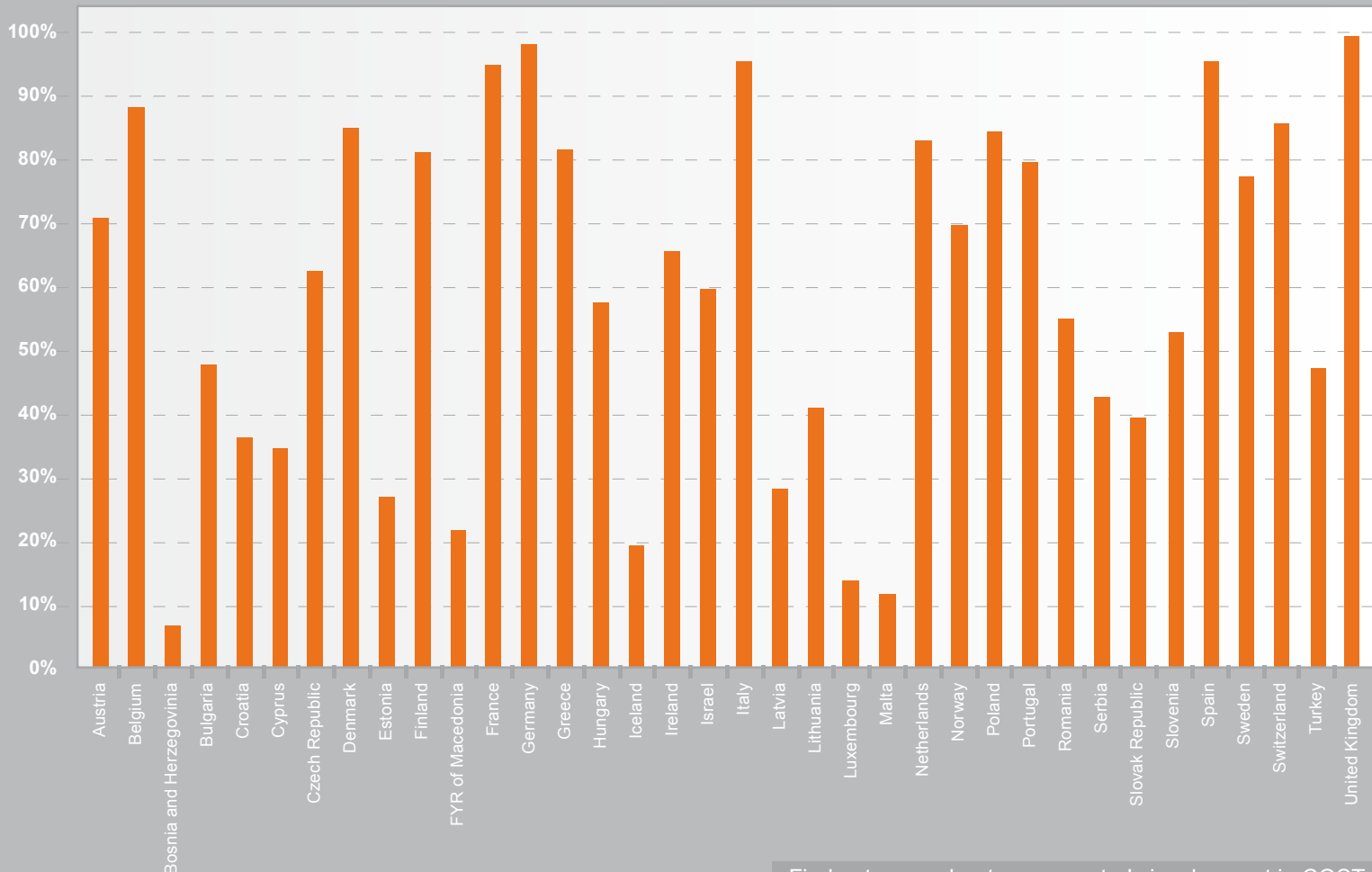
Parties: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Ireland, Israel, Italy, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom (Total 26)

Non-COST Institution participation from the Conservation Center, Institute of Fine Arts, New York University (US).

Action website: <http://www.echn.net/enviart/>



All COST countries participate - An overview



Find out more about your country's involvement in COST Actions on http://www.cost.eu/about_cost/cost_countries



Earth System Science and Environmental Management (ESSEM)

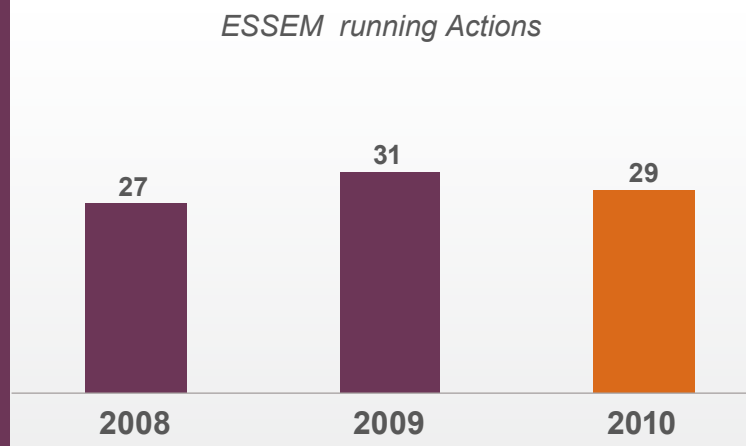
The ESSEM Domain encompasses the rapidly-growing science and technology agendas relating to better understanding, observing, modelling and predicting the Earth system and thereby improved management of environmental conditions. It emphasises science and technology activities related to observing, modelling and predicting Earth System changes and severe hazards, by integrating various monitoring techniques and networks, and by improving natural resource management to minimise environmental degradation.

Domain website:
<http://www.cost.eu/essem>

Domain Committee Chair:
Dr Ipek Erzi

COST Office Science Officer:
Dr Basak Kisakürek
essem@cost.eu

ESSEM running Actions



Metals and Related Substances in Drinking Water

COST Action 637

Publication:
Protocol on Water and Health – United Nations Economic Commission for Europe:
http://live.unece.org/env/water/text/text_protocol.html

The contamination of drinking water by metals occurs throughout the 'source-to-tap' production and delivery system. The main objective of this Action was to stimulate better control of metals and related substances in drinking water and to minimise environmental impacts.

This Action was successful in a number of areas.

- Stimulated much-needed knowledge exchange within Europe various workshops, conferences, training and exchange visits concerning delegates from over 20 countries. These events created a critical mass of knowledge in several important aspects, e.g. variation in sampling practice, non-compliance with EU standards, geographical perspectives etc.
- Developed a programme of collaborative research.
- Gained a better understanding of the possible impact of metals and related substances on human health.
- Provided further information on the measures needed for control.
- Publicised the Action results through the UNECE (United Nations Economic Commission for Europe) Protocol on Water and Health and influenced policy makers, such as the EC (European Commission) and WHO (World Health Organization).
- The Action activities are ultimately expected to



have an impact, at least in part, on several socio-economic issues:

- an improvement to the health of up to 25% of Europe's population through reductions in exposure to lead from drinking water;
- clarification of the significance of nickel leaching from nickel-chrome fittings (particularly taps) and the potential need for the use of alternative materials;
- possible support to the dissemination, debate and wider acceptance of a recently harmonised scheme for controlling the metal materials that come into contact with drinking water;
- clarification of the health implications of marginal non-compliance with the standard for arsenic in drinking water and an influence on the timescale for corrective action.

The Action has continued its research and activities by moving towards self-funding via the publication of a series of Best Practice Guides, by running associated training courses and by running international conferences and seminars. This transition from the Action to a Specialist Group of the International Water Association was successfully accomplished in spring 2011.

Chair of the Action: Dr Colin Hayes (UK)

Vice Chair of the Action: Ms Maria Joao Gouveia Benoiel (PT)

Duration of the Action: 2006 – 2010

Parties: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Latvia, Lithuania, Netherlands, Poland, Portugal, Romania, Serbia, Spain, Sweden, Switzerland, Turkey, United Kingdom (Total 26)

Action website: <http://www.cost.eu/essem/Actions/637>

Greenhouse gas budget of soils under changing climate and land use (BurnOut)

COST Action 639

Due to the significance of the greenhouse gas exchange between the atmosphere and soils, carbon changes in terrestrial ecosystem pools are included in international treaties (Kyoto Protocol, UNFCCC)

This Action assessed the relationship of greenhouse gas emissions to the sink strength of soils under different forms of land use, especially under future climate conditions and in regimes of ecosystem disturbances that are typical for particular regions.

Carbon (C) stored in soils represents the largest terrestrial organic carbon (C) pool. The biogeochemical cycles of C and nitrogen (N) are closely interwoven. Although the discussion on climate change focuses on CO₂, the coupled cycling of C and N deserves equally much attention. Both C and N occur in terrestrial ecosystems in several chemical forms and are potentially emitted as greenhouse gases (GHG).

The scientific breakthroughs of this Action are numerous.

- The Action has delivered the first assessment of the status of information for greenhouse gas reporting on Mediterranean countries.
- A clear position has been taken with respect to available **soil carbon simulation models**.
- A gaining of new knowledge of soil C change following most of the relevant **land-use changes** occurring within Europe. This work has been published in a peer-reviewed paper with the potential to become well cited.
- Presented a thorough overview capturing the





state-of-knowledge of disturbance events which have been shown to greatly affect the emissions of greenhouse gases from soils.

- A common Ph.D. project in Denmark and Italy on the effects on soil C of abandonment of grasslands and subsequent forest encroachment has been launched.

Publication:

Greenhousegas Budget of Soils under Changing Climate and Land Use (Burnout)

The **main result** of this Action is an improved understanding of the management of GHG emissions, and the elaboration of a meaningful proposal for the evaluation of GHG emissions from terrestrial ecosystems. This serves as a useful contribution to guidelines for future European proposals in the field of environmental management.

Chair of the Action: Dr Robert Jandl (AT)

Vice Chair of the Action: Prof. Mats Olsson (SE)

Duration of the Action: 2006 – 2010

Parties: Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Czech Republic, Denmark, Estonia, Finland, Germany, Greece, Hungary, Ireland, Israel, Italy, Lithuania, Netherlands, Norway, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom (Total 26)

Non-COST institution participation from the Agrophysical Research Institute (RU) and the Faculty of Forestry University of Sarajevo (BA).

Action website: <http://bfw.ac.at/rz/bfwcms.web?dok=5906> and

<http://www.cost.eu/esseem/Actions/639>



Assessing and Managing Nitrogen Fluxes in the Atmosphere-Biosphere System in Europe

COST Action 729

Publication:

Final Report COST Action 729: Assessing and Managing Nitrogen Fluxes in the Atmosphere-Biosphere System in Europe

The main objective of the Action was to advance the understanding and quantification of atmosphere-biosphere nitrogen fluxes in Europe in relation to the main economic sectors, interactions with the natural environment and current policies, in order to establish a sound scientific basis for strategies to reduce the environmental impacts of nitrogen.

In Europe, **atmospheric deposition of reactive nitrogen species** is one of the major threats to ecosystems. Increased deposition has led to soil acidification, eutrophication, nutrient imbalances, losses of biodiversity, altered forest growth and soil water pollution.

Following the atmospheric deposition of nitrogen compounds to terrestrial and aquatic ecosystems, reactive nitrogen accumulates and can lead to a cascade of effects. Quantifying the **nitrogen cascade** is one of the most challenging environmental issues at the moment.

However, this quantification of the different fluxes and their interactions is essential to provide the basis for assessment tools to combat nitrogen accumulation in the environment.

Two key success stories:

1. One of the core products of this Action is the European Nitrogen Assessment (ENA), which was launched during the Nitrogen and Global Change International Science Conference (Nitrogen2011) in Edinburgh in April. The ENA has drawn all major nitrogen scientists together producing the first assessment of the state of knowledge and gaps in research and policy in Europe. This assessment is initiated through the European Science Foundation Programme Nitrogen in Europe (NinE) and supported through the Action and the National scientific contributions. The ENA



is now well underway and provides a platform for the nitrogen network, acting as the host, archive and dissemination tool. There are currently over 300 registered users from 30 countries.

- The Action also worked through the establishment of the Global Partnership on Nutrient Management (GPNM), initiated by UNEP Global Water Action plan. This Partnership was launched in May 2009 at the Convention on Sustainable Development (CSD). This Action contributed to the annual NitroEurope General Assembly meeting in February 2010 in Solothurn (NitroEurope), which also contained a scientific program.

Chair of the Action: Dr Jan Willem Erisman (NL)

Vice Chair of the Action: Dr Peringe Grennfelt (SE)

Duration of the Action: 2005 – 2010

Parties: Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom (Total 19)

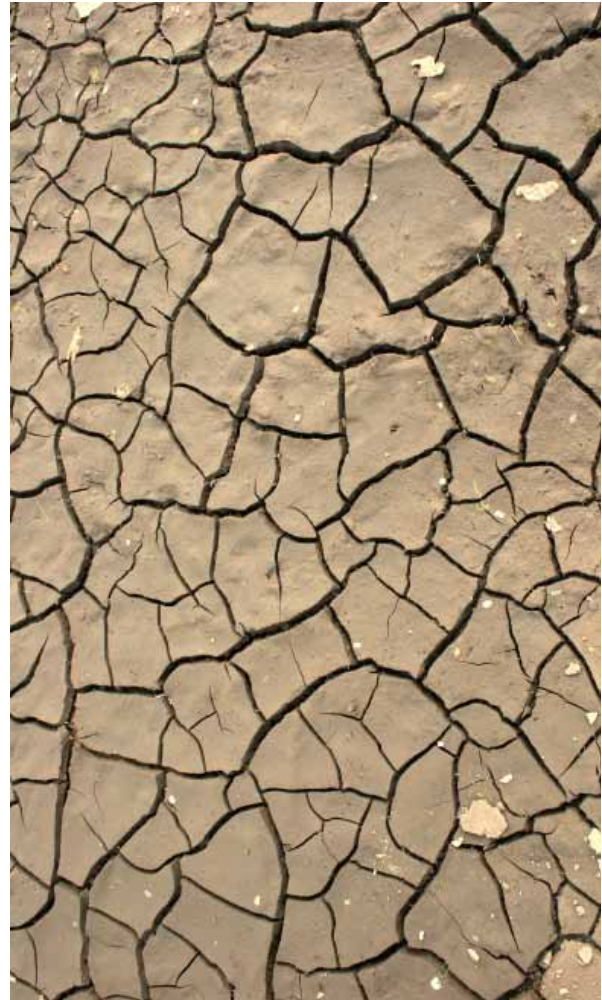
Action website: <http://cost729.ceh.ac.uk/> and <http://www.cost.eu/essem/Actions/729>

Propagation of Uncertainty in Advanced Meteo-Hydrological Forecast Systems

COST Action 731

Operational Numerical Weather Prediction (NWP) in Europe is organised into several consortia of National Weather Services (NWS), each built around a particular NWP model. In recent years, the concept of probabilistic forecasting has gained significant momentum in the NWP community.

The Action addressed the problem of forecasting (heavy) precipitation events and the corresponding hydrological processes in connection with the uncertainty inherent in this task. By addressing the description of the quality and uncertainty of meteorological observations, especially from remote sensing and other potentially valuable instrumentation a more complete information for the decision makers can be made to produce an assessment of the probability that a flood may occur.



In recent years, the concept of **probabilistic forecasting** has gained significant momentum in the NWP community. In 'ensemble prediction systems' (EPS), a collection of forecasts is prepared from some combination of different analyses or different NWP models, and the output is analysed in probabilistic terms, recognising the effect of observational uncertainties, model errors and the chaotic, nonlinear behaviour of atmospheric dynamics.

This Action has enjoyed many successes.

- Innovative networking has resulted in knowledge transfer and significant scientific breakthroughs.
- The close contact between meteorologist and hydrologists has given a major boost to the usage of quantitative precipitation forecasts (QPF) from numerical weather prediction (NWP) models in the operational environment.
- The Action has resulted in the advancement and promotion of knowledge particular to this area of research through publications and other outreach activities.

**Two key success stories:**

1. By changing the mentality at a scientific and operational level, in that more and more hydrological forecast systems are sought to be run in probabilistic mode, both with probabilistic meteorological input (radar and NWP!) as well as accounting for the hydrological model uncertainty. The MAP D-PHASE Visualization platform constitutes an impressive way to synthesize massive loads of forecast information. This was much appreciated by the end users.
2. By facilitating communication across the distinct disciplines and stakeholders involved, i.e. radar meteorology, NWP, hydrological modelling, flood warning communication, and decision makers.

Chair of the Action: Dr Andrea Rossa (IT)

Vice Chair of the Action: Mr Michael Bruen (IE)

Duration of the Action: 2005 – 2010

Parties: Belgium, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, United Kingdom (Total 22)

Non-COST institution participation from the Centre for Australian Weather and Climate Research (AU).

Action website: <http://cost731.bafg.de/servlet/is/9691/?lang=en> and <http://www.cost.eu/essem/Actions/731>

Harmonisation and Applications of Weather Types Classifications for European Regions

COST Action 733

Concise descriptions of the actual atmospheric conditions are necessary for many environmental applications.

The main objective of the action was to achieve a general numerical approach for assessing and comparing classifications of **atmospheric circulation patterns** and typical weather situations in European regions.

A weather type classification is an algorithmic method which distinguishes between meteorological situations describing them by circulation parameters (e.g. zonality, cyclonality, position of low and high pressure systems etc.) or by local weather elements such as temperature or precipitation.

Circulation parameters are often preferred since such parameters can very easily be used to relate certain features of the atmospheric circulation with local weather by statistical methods.

There are several notable outcomes of this Action.

- The broad nature of the Action ensured a wide range of evaluation approaches and extensive cross-disciplinary discussions and cooperation. The resulting network covers a wide range of different application disciplines, ensuring its impact on several environmental and societal disciplines.
- It brought together scientists from several scientific disciplines which offered a unique platform for cross-disciplinary cooperation. Disciplines included in testing the application of weather type classifications are hydrology (with a focus on drought), forest fires, air quality, and air pollution in addition to traditional meteorological and climatological applications such as hydrology (with a focus on drought), forest fires, air quality, and air pollution as well as traditional meteorological and climatological applications.

The scientific impact of this Action is high, as it has successfully provided a unique opportunity to test a huge number of classifications within a coordinated interdisciplinary environment. The feedback from this testing and evaluation offers significant knowledge for developing a new weather type classification method for European Regions.

Chair of the Action: Mr Ole Einar Tveito (NO)

Vice Chair of the Action: Dr Radan Huth (CZ)

Duration of the Action: 2005 – 2010

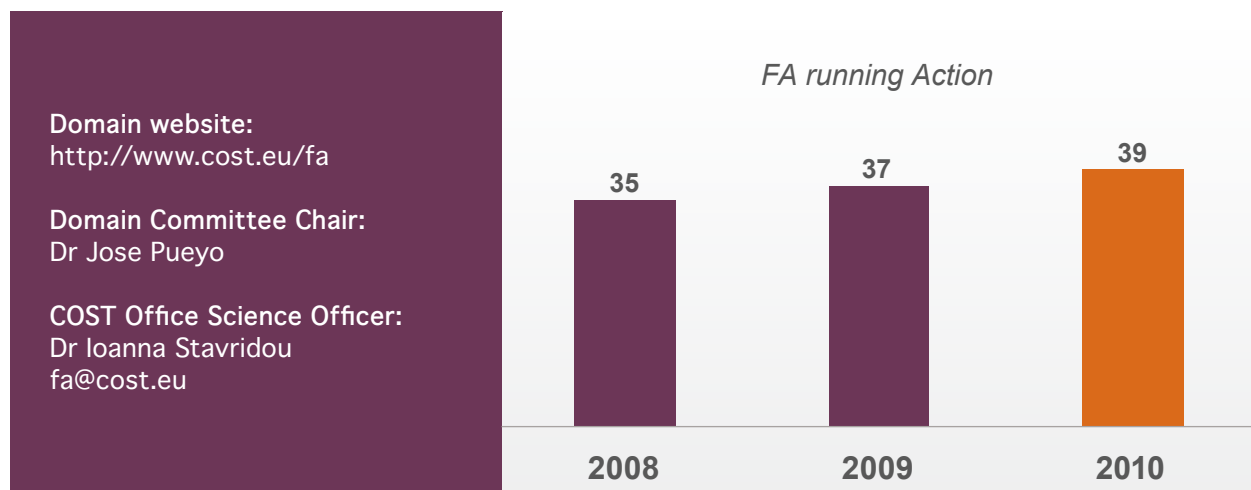
Parties: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Luxembourg, Norway, Poland, Portugal, Romania, Slovenia, Spain, Switzerland, United Kingdom (Total 23)

Action website: <http://www.cost.eu/essem/Actions/733>



Food and Agriculture (FA)

The FA Domain covers all aspects of research in the field of agricultural and food sciences in its widest sense. The primary aim of the Domain is to encourage research networking in any field linked to these activities as well as the related demands and needs. The Domain naturally encompasses a very wide number of topics and relates to many areas of human activity. It actively seeks innovative and interesting proposals even if they may not, at first sight, fit neatly into a traditional category of research in food and agriculture.



Bacterial Toxins for Insect Control COST Action 862

Publication:
Insect Pathogens and Insect Parasitic
Nematodes

The main objective of the Action was to increase the availability of new and improved bacterial antagonists and their toxins for use in the **biological control of insects in conventional and organic agriculture**. The economic value, to the biocontrol industry and the growers, of this Action is considerable.

This Action aimed to contribute to the increase in product quality by supporting the development of innovative quality control methods and agreements on standards. This main objective was subdivided into five main areas of interest:

- mode of action of toxins
- resistance management
- integrated pest management
- safety and ecology of Entomopathogenic Bacteria
- aspects of commercialisation.

The Action has had several commercial successes.

1. A relevant and notable outcome of the Action is Biocepest Srl. This is a spin-off company that has been started as a direct result of this Action. The mission of this research-based company parallels one of the Action's main objectives - **the discovery of new entomopathogens**, their subsequent development and their commercialisation.
2. In 2009, the Action competed in Italian multidisciplinary competition involving research groups from the major Italian Universities and achieved the first place, which involved two important awards: the National Prize for Innovation 2009; and the "Premio dei Premi" awarded by the President of the Italian Republic, Giorgio Napolitano.



3. A joint project Bioecopest-Intrachem was also funded between two COST Action 862 participating groups. Intrachem also linked up with another COST partner to develop improved products aimed at controlling Red Pine Weevil.
4. Collaborative work between COST Action 862 members, including a Short Term Scientific Mission (STSM), led to the development of a new Bt (Bacterial toxin) product to control leatherjackets.

A **noteworthy outcome** of this Action involves the collaborative effort of the members of the Action, which successfully disproved the widely promoted hypothesis concerning the pathogenesis of *Bacillus thuringiensis*. COST Action 862 authors were invited to publish a summary of their findings in the journal 'Trends in Microbiology'.

Chair of the Action: Dr Neil Crickmore (UK)
Vice Chair of the Action: Prof. Ralf-Udo Ehlers (DE)
Duration of the Action: 2005 – 2010
Parties: Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Israel, Italy, Latvia, Netherlands, Poland, Slovak Republic, Spain, Switzerland, Turkey, United Kingdom (Total 19)
 Non-COST institution participation from the Centre of Biotechnology of Sfax (TN).
Action website: <http://www.cost862.com/> and <http://www.cost.eu/fa/Actions/862>



Euroberry Research: from Genomics to Sustainable Production, Quality & Health

COST Action 863

Publication 1:

Journal of Berry Research

Publication 2:

A Guide to Some In Vitro Techniques – Small Fruits

Berry production is an economically significant part of agriculture in most European countries. The main objective of the Action was to improve the quality and production of berries to benefit the health of the consumers and **maintain profitable European production using sustainable systems.**

The Action focused on four areas of research and development:

1. from genomics to variety evaluation,
2. nursery production system and plant quality control,
3. plant physiology and culture management,
4. consumer health i.e. components and factors which affect berry nutritional value.

An outstanding outcome of this Action is the approval of the proposal 'EUBerry' which was submitted under the Seven Framework Programme (FP7). The project started early 2011 with the specific aim to develop most of the more important issues on EU berry research and cultivation which have emerged directly from the COST Action 863 activities.

Another achievement of the network is the creation of a newly refereed "berry journal"; the "Journal of Berry Research" was launched in spring 2010 by IOS Press. The Journal will serve as a vehicle for increased collaboration and as a consequence, stimulate new insights.

A **further major output** of the Action was the organisation of the symposium, 'S01 BERRIES: From genomics to sustainable production, quality and health' which was included in the ISHS' (International Society for Horticultural Science) 28th International Horticultural Congress (IHC2010). The



symposium allowed the Action members to share the main results at an international level and in the presence of both academia and SMEs (Small and Medium Enterprises).

Chair of the Action: Dr Bruno Mezzetti (IT)

Vice Chair of the Action: Dr Rolf Nestby (NO)

Duration of the Action: 2006 – 2010

Parties: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Latvia, Lithuania, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom (Total 32)

Non-COST institution participation from The Horticulture and Food Research Institute Limited (HortResearch) (NZ).

Action website: <http://www.euroberry.it/> and <http://www.cost.eu/fa/Actions/863>

Bioencapsulation multiscale interaction analysis

COST Action 865

Publication:

XIV International Workshop on Bioencapsulation & COST 865 Meeting - Proceedings

The main objective of the Action was the development of a reliable, economical, effective and safe industrial encapsulation process and its wide application.

One of the Action's main priorities was to develop a well-functioning industrial-academic relationship. This was achieved in two steps.

1. The network organised industrial-specific events where academia was invited to present scientific overviews of a specific topic on microencapsulation;
2. The Action built-up a substantial industrial address book (60 % of the Action's contacts were industry-linked); these contacts were then invited to scientific

events, leading to the Action conferences and workshops having levels of up to 20% industrial participation.

The Action had several important successes.

- It developed an active international network, encompassing 26 countries. The network consists of researchers (and industrial partners) from very different and various scientific and industrial areas, giving the Action an outstanding interdisciplinary approach to the topic of bioencapsulation.
- It promoted methods for the standardisation of encapsulation to ensure safety, quality and reliability during the application of encapsulation techniques.
- It supported the establishment of several new SMEs – as several members were able to develop commercial products as a direct result of the Action.
- It established a Bioencapsulation Research Group (<http://bioencapsulation.net/>) through which some further events are already planned (summer school, workshops and symposia).

A **significant breakthrough** of the Action was the integration of the multi-scale and multi-dimension of the bioencapsulation procedure, and the development of a well-functioning and cooperating network on the topic that is a powerful approach for resolving many scientific, agricultural, industrial and medical challenges.

Chair of the Action: Prof. Denis Poncelet (FR)

Vice Chair of the Action: Prof. Dimitrios Rekkas (EL)

Duration of the Action: 2006 – 2010

Parties: Austria, Belgium, Czech Republic, Denmark, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Ireland, Israel, Italy, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovak Republic, Slovenia, Spain, Switzerland, United Kingdom (Total 26)

Action website: <http://cost865.bioencapsulation.net/> and <http://www.cost.eu/fa/Actions/865>



Green Care in Agriculture

COST Action 866

As a result of rapid development of biotechnological methods, novel enzymes and activity types can be isolated from nature for subsequent exploitation in different process stages.

The main objective of COST Action 866 “Green Care in Agriculture” was to increase the scientific knowledge on the best practices for implementing green care in agriculture with the aim of improving human mental and physical health and the quality of life.

The Action set out four main objectives:

1. to establish a **well-functioning multidisciplinary scientific network** of scientists working on, or interested in working on scientific topics of relevance to green care in agriculture;
2. to develop an international research agenda within green care for proposal to EU institutions and to national research councils;
3. to increase the scientific knowledge on topics of relevance to green care, gain experience and knowledge on green care and discern how various scientific disciplines could cooperate to achieve this objective;
4. to improve the relevance, efficiency and quality of current and new research within green care in Europe.

One of the most important results of the COST Action in order to structure its own scientific and practical future was the establishment of the research strategy “**Unlocking the Potential of Green Care in Europe**” which tackled four main areas.

1. Green Care as a process of social innovation
2. Studies of effectiveness, outcomes and mechanisms
3. Green Care and regulatory instruments
4. Exploring the economics of Green Care.

The **most significant result** of the Action is the opening of a new policy field. Green Care is now supported by the Rural Development Plans in Europe. This Action provides most of the literature and expertise for putting national programs into practice. The “European Manifesto on social farming:

opening of a policy field” has had a wide impact on the field.

Chair of the Action: Dr Deirdre O Connor (IE)

Vice Chair of the Action: Dr Katriina Soini (FI)

Duration of the Action: 2006 – 2010

Parties: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Malta, Netherlands, Norway, Poland, Portugal, Slovenia, Sweden, Switzerland, Turkey, United Kingdom (Total 22)

Action website: <http://www.umb.no/greencare> and <http://www.cost.eu/fa/Actions/866>

Control and exploitation of enzymes for added-value food products

COST Action 928

The European food industry must continuously increase its competitiveness by implementing more advanced technologies for the processing and creation of added value to the final products.

Enzymes offer a sustainable, specific processing tool to the food industry: due to the specificity of enzymes, a variety of chemistries can be obtained by the controlled action of these biotools in the food matrix.

The full **exploitation of these novel biotools** in processing requires, however, a thorough understanding of the reaction mechanisms involved in both micro- and macroscale.

The main objective of the Action was to accelerate the development of novel bioprocesses for different food materials i.e. to develop tailored bioprocessing technologies for cereal, berry, fruit, vegetable and proteinaceous (dairy, meat, fish) food raw materials in order to obtain higher quality food products.

The Action succeeded in:

- increasing our basic knowledge on the mode of action of hydrolytic and non-hydrolytic enzymes in food matrices using advanced analytical techniques and model substrates as tools;
- identifying new enzymes;
- action members were actively incorporated into national projects with an international dimension, in the form of STSMs (Short Term Scientific



Mission) and longer visits. Hence the Action significantly contributed to generation of ERA (European Research Area).

A **key outcome** of the Action was the direct generation of several EU and other publicly funded projects covering different aspects of the research value-chain.

Chair of the Action: Prof. Johanna Buchert (FI)

Vice Chair of the Action: Dr Craig Faulds (ES)

Duration of the Action: 2006 – 2010

Parties: Austria, Belgium, Bulgaria, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Lithuania, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovak Republic, Slovenia, Spain, Turkey, United Kingdom (Total 24)

Non-COST institution participation from The University of Queensland (AU).

Action website: <http://virtual.vtt.fi/virtual/cost928/> and <http://www.cost.eu/fa/Actions/928>

A European Network for Environmental and Food Virology COST Action 929

Publication:

Advances in Horticultural Science

The main focus of the Action was **noro- and hepatitis A viruses** for their obviously high relevance as food- and waterborne pathogens. Other types of human enteric viruses were also considered along with bacteriophages and animal caliciviruses as potential surrogates in testing viral resistance to physical and chemical treatment.

The Action has delivered a range of notable achievements.

- an updatable food and environmental virology research projects database;
- a review of the development of an algorithm of actions to be taken in cases when serious contaminations of food and/or environment are suspected;
- a report on the results of a questionnaire regarding existing food and environmental virus surveillance activities in EU countries, which will serve as the basis for the structure of an environmental surveillance network;
- an inventory of new skills and knowledge in the field of **environmental virology** including their implementation in participating laboratories;
- a register of currently available analytical methods for virus detection in water and food;
- recommendations on the appropriate quality controls, terms and definitions in **standardised molecular virus detection** in food;
- creation of a data analysis tool, and tools for estimating the risk of viral infection through drinking water prepared from both surface and from ground water;
- statistical models of virus inactivation based on I) a collection of published data on heat and UV inactivation of enteric viruses and viral indicators, II) the identification of gaps in virus inactivation concerning temperature effects and chlorine treatment.

The Action also provided a better means for defining:

- the relative resistance of various types of viruses in common types of environmental matrices;
- potential viral targets for end-users in studies on virus detection/inactivation;
- the possible application of the HACCP (Hazard analysis and critical control points) approach in preventing the risk from viral contamination.

Before this Action, the study of food and environmental virology had been conducted by research groups largely working independently of each other, but now there is far greater collaborative interaction between practitioners; the promotion of this beneficial interaction was a **major outcome** of the Action.

Chair of the Action: Dr Nigel Cook (UK)

Vice Chair of the Action: Dr Ana Maria De Roda Husman (NL)

Duration of the Action: 2006 – 2010

Parties: Belgium, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Israel, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Serbia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom (Total 24)

Non-COST institution participation from the Centers for Disease Control and Prevention (CDC) (US), Health Canada (CA), Institute of Environmental Science & Research (NZ), Monash University (AU),



National Research Center (NRC) (EG) and the University of Pretoria (ZA).

Action website: <http://www.cost929-environet.org/> and <http://www.cost.eu/fa/Actions/929>

Cryopreservation of Crop Species in Europe

COST Action 871

Plant germplasm stored in liquid nitrogen (-196°C), i.e. in cryogenic storage, does not undergo cellular divisions; this temperature also stops the metabolic process and most physical processes. The germplasm can therefore be maintained for very long periods with none of the problems typical for storage in the active growth state, such as genetic instability and the loss of accessions due to contamination, loss of vigour and totipotency and human error during continual subculturing.

So far, cryopreservation procedures have been developed for the *in vitro* tissues and non-orthodox seeds of about 200 plant species. However, there are still a very limited number of examples in Europe where cryopreservation is used routinely for plant germplasm conservation.

The goal of this Action was to create a network that brings together European scientists with an expertise and/or interest in plant cryopreservation with the main aim of improving and applying technologically advanced techniques for plant genetic resources conservation of crops that are grown and/or conserved in Europe with the main emphasis on **long-term conservation through cryopreservation**.

The Action enjoyed several successes:

1. Provided solid knowledge on the efficiency of existing protocols.
2. The inter-linkage of research on fundamental mechanisms of cryo-injury was combined with the improvement of methodologies and the development of novel approaches in both
3. Significant advances in the coordination of plant cryopreservation were achieved with technology transfer, improved standards across the consortium (e.g. droplet vitrification techniques, dormant bud techniques), much innovative research and application across the participant institutions (e.g. the droplet vitrification protocol was adopted by over 70% of the participants/institutions involved).
4. Made significant progress in improving procedural standards and thus enhancing applicability and survival/ quality of preserved materials. Scientific breakthroughs included the use of cotyledons to facilitate the conservation of recalcitrant zygotic embryos *in vitro* and the use of multi-well microplates to facilitate high throughput cryo-screening of plant materials.

In general terms, **innovative research on genetic stability** undertaken during the Action resulted in enhancement of the value of this approach to the community both within Europe and worldwide.

The **major outcome** of this Action is that plant cryopreservation within Europe has risen to a more coordinated level and positioned itself as a leader in this field and is expected to result in a strong legacy of collaboration, R&D and application.

Chair of the Action: Dr Bart Panis (BE)

Vice Chair of the Action: Prof. Paul Lynch (UK)

Duration of the Action: 2006 – 2010

Parties: Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Greece, Italy, Luxembourg, Netherlands, Poland, Portugal, Romania, Serbia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom (Total 21) Non-COST institution participation from the Faculte des Science de Sfax (TN), the New Zealand Institute for Crop & Food Research (NZ) and the Vavilov Institute of Plant Industry (RU).

Action website: <http://www.biw.kuleuven.be/dtp/tro/cost871/home.htm> and <http://www.cost.eu/fa/Actions/871>



Forests, their Products and Services (FPS)

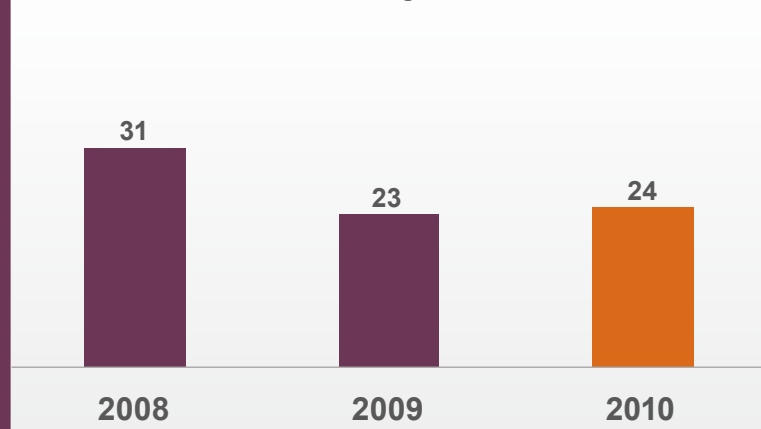
The FPS Domain has the mission to promote research along the whole forest-wood-chain by providing a platform for effectively coordinating nationally-funded research activities in the areas of forestry, wood technology, and pulp and paper. Areas of actual research in this Domain include, for example, Forestry Research, Forests and Environment, Wood Technology, Bioenergy from Forests, to name but a few. At a cross-sector level, the Domain addresses issues such as sustainability assessment, life-cycle analysis, tourism, public health, energy production and recycling.

Domain website:
<http://www.cost.eu/fps>

Domain Committee Chair:
 Dr Sjur Baardsen

COST Office Science Officer:
 Melae Langbein
fps@cost.eu

FPS running Actions



European forest externalities (EUROFOREX)

COST Action E45

Publication:

Link to online version of the Journal of Forest Economics: <http://www.sciencedirect.com/science/journal/11046899>

The main objective of this Action was to improve the quality standards in the valuation of externalities produced by the different types of forest in Europe – and agreeing a set of research protocols for investigators to follow. Furthermore, to improve and spread the practice of benefit transfer, and thereby

increase **the use of forest externality values** as a tool for the valuation of forest nature as a European resource.

There are a number of successful aspects of this Action to be noted.

- High participation level - the guidelines are a product of the agreement of a considerable number of specialists in the field from Europe and abroad. This increases the likelihood of the protocol to be implemented by stakeholders.
- Interdisciplinary nature - the guidelines try to avoid the bias of one discipline when the subject is essentially inter-disciplinary.
- Communication - the Action proved that the best way to deliver these guidelines to young researchers and other end-users is with an open access electronic format. Furthermore, the



participants have agreed to include the guidelines in all future publications where possible. Thirdly, the main contributions of this Action are to be published in a special edition of the 'Journal of Forest Economics'.

- Presence of end-users throughout the process - the main end-users targeted by this Action, i.e. Early Stage Researchers (ESRs) from different disciplines, were part of the process from the beginning, again increasing the likelihood of the guidelines being implemented.
- New spin-off projects – as a direct result of the Action, the next project will involve the building of a forest valuation database containing the relevant information identified in the good practice protocol. Further projects are expected.
- Network building and training - the Action has built a network which has resulted in numerous exchanges, in the form of Short Term Scientific Missions (STSMs), Training Schools, and numerous one-to-one collaborations. This should ensure the successful future of the network.

The **main outcome** of this Action was to produce a set of high quality, state-of-the-art best practice protocols for forest valuation. This target was achieved, but most importantly, the protocols were reached with the consensus among scientists and specialists in Europe, along with the contribution of leading scholars from countries outside Europe, mainly the United States of America.

Chair of the Action: Prof. Pere Riera (ES)

Vice Chair of the Action: Dr Giovanni Signorello (IT)

Duration of the Action: 2006 – 2010

Parties: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Israel, Italy, Netherlands, Norway, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom (Total 20)

Non-COST institution participation from the National Institute for Research on Rural Engineering, Water and Forests (INRGREF) (TN) and the University of Waikato (NZ).

Action website: <http://www.cost.eu/fps/Actions/E45>

Integrating Innovation and Development Policies for the Forest Sector

COST Action E51

Publication:

Policy Integration and Coordination: the Case of Innovation and the Forest Sector in Europe

Publication 2:

Innovation in Forestry - Territorial and Value Chain Relationships

The main objective of this Action was to develop knowledge that would better enable the integration of innovation and development policies for a more effective and **sustainable development of the forest sector**.

The Action's objectives were successfully concluded.

1. Dissemination of Results: The main results of the Action's work and its policy recommendations were presented in the Final Conference "The role of policy in European forest-based innovation: bridging sectoral and territorial approaches" which provided an important discussion forum for researchers, policy-makers from the European Commission (EC), policy-makers from a national level, and stakeholders from the forestry and the forest sector as well as rural development practice.
2. Publications: The comparative analysis of policies is included in the book "Policy Integration and Coordination: the Case of Innovation and the Forest Sector in Europe" (ed. Rametsteiner et al., publ. 2010 by OPOCE). The final publication "Innovation and European forestries: territorial and value chain approaches" will be the first comprehensive overview and assessment of relevant research approaches for the study of innovation processes and policies in the forest sector and their application in the most relevant current innovation fields in the sector (edited by Weiss et al., published 2011 by CABI).
3. Networking: During its lifetime, the Action created close ties with the Forest-Based Sector Technology Platform (FTP) and contributed to their Innovation Task Force. It connected with stakeholders from forestry, the forest sector and rural development. The Action had over 60 active members from



20 Europe countries. The Action supported networking in eight joint meetings and supported Early Stage Researchers (ESRs) through 11 Short Term Scientific Missions (STSMs).

One of the **key outcomes** of the Action is the continuation of the important work carried within all the Working Groups and STSMs, as the research groups continue to work on further joint publications. The Action has helped to establish new opportunities for conducting scientific work at a more international level. The coordination of the Action by the EFI PC INNOFORCE (now EFI Regional Office EFICEEC) proved valuable because the Action could build upon the prior work and the topics will be carried on within the EFICEEC framework.

Chair of the Action: Dr Gerhard Weiss (AT)

Vice Chair of the Action: Dr Peter Elsasser (DE)

Duration of the Action: 2006 – 2010

Parties: Austria, Belgium, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Italy, Lithuania, Norway, Poland, Portugal, Romania, Slovak Republic, Sweden, Switzerland, United Kingdom (Total 20)

Non-COST institution participation from the State Agrarian University of Moldova (MD).

Action website: <http://www.boku.ac.at/coste51/> and <http://www.cost.eu/fps/Actions/E51>

Evaluation of Beech Genetic Resources for Sustainable Forestry COST Action E52

Beech trees are important for both economic and ecological reasons; they produce valuable hardwood; and its forests constitute stable ecosystems especially beneficial for ground water production and the regeneration of depleted soils.

Due to climate change, a shift in the distribution range of beech is expected, which would endanger considerable parts of the present beech forests. Subsequently, **the conservation of beech genetic resources** and safeguarding the continued procurement of **high quality reproductive material** need more attention.

The main objective of COST Action E52 was to study the adaptive and structural traits and to predict the future distribution range of beech forest ecosystems under the assumption of certain climate change scenarios.

The key outcomes of this Action include:

- One of the most important signifiers of this Action's success is that all the countries hosting **beech provenance trials** are participating in this COST Action. Furthermore, countries where beech may be strongly endangered, e.g. Greece, Serbia, and Switzerland are also involved. The data of all field trials can therefore be evaluated jointly with respect to the effect of climate change on different beech provenances at all relevant locations throughout Europe; and utilised to evaluate the adaptive potential of forest trees.
- A very successful summer school, which provided information and instructions on the collection of **ecophysiological data** on beech trees in the provenance trials under field conditions, was held during the Action.
- A joint research proposal "EUROBEECH" was submitted to the EU and a proposal for a COST Action has been submitted "Biosafety of transgenic trees: improving the scientific basis for safe tree development and implementation of EU-policy directives", thus ensuring the continuation of the work of COST Action E52.

Publication:

Training School 'Modern Techniques in Beech Ecophysiology' 16-20 June 2008.

A key success of this Action was its influence in generating national funding of research on genetic variation of beech and on beech provenances in a number of countries e.g. Czech Republic, France, Greece, Italy, Sweden, Switzerland, and others. This additional national funding may support and complement the data collections and evaluations to be carried out in the COST Action.

Chair of the Action: Dr Georg von Wuhlisch (DE)

Vice Chair of the Action: Dr Gregor Bozic (SI)

Duration of the Action: 2006 – 2010

Parties: Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Netherlands, Poland,



Romania, Serbia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom (Total 23) Non-COST institution participation from the Ukrainian State University of Forestry and Wood Technology, Faculty of Forestry (UA).

Action website: http://www.bfafh.de/inst2/cost_e52/index.htm and <http://www.cost.eu/fps/Actions/E52>

Quality control for wood and wood products

COST Action E53

This Action aimed at the improvement of existing methods and techniques and the development of novel methods and techniques for fast, accurate quality assessment and control in processing associated with wood and timber.

Overall, a total of 24 countries were involved in this Action, which resulted in the successful exchange of the scientific and industrial results from various ongoing projects in Europe. Further successes include:

- The Action and its Working Groups (WGs) provides an opportunity to exchange information and ideas in the future. These ideas will lead to the design and realisation of various international co-operation projects.
- The Action identified the need for information on ways of improving quality properties important to some end-users. By generating qualitative and quantitative knowledge about demands and expectations that end-users in European countries impose on various timber products, future important quality parameters can be identified and important assessment and control may be improved and further developed.
- The Action also promoted the improvement of specifications for timber products and contributed to the economic optimisation of production so the full environmental and sustainability benefits of the forestry wood chain can be realised.

One of the **more significant effects** of the Action is through the increased awareness of the regional differences and the perception of quality parameters among the scientists involved in this Action, the producers of timber products and the users. Improved quality control systems will help to increase the competitiveness of the wood sector and that

European wood industry will provide wood products that are well adapted to end-user requirements.

Chair of the Action: Prof. Robert Kliger (SE)

Vice Chair of the Action: Dr Johannes Welling (DE)

Duration of the Action: 2006 – 2010

Parties: Austria, Belgium, Bulgaria, Croatia, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Netherlands, Norway, Poland, Portugal, Serbia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom (Total 25)

Action website: <http://www.coste53.net/> and <http://www.cost.eu/fps/Actions/E53>

Characterisation of the fine structure and properties of papermaking fibres using new technologies

COST Action E54

Publication 1:

Characterisation of the Fine Structure and Properties of Papermaking Fibres Using New Technologies

Publication 2:

Fine Structure of Papermaking Fibres - The Final Report of COST Action E54

The main objective of the Action was to generate new knowledge on the micro- and nanostructure of papermaking fibres and properties required for the efficient and sustainable use of fibres in traditional, advanced and future products.

This Action brought together scientists and experts from wood chemistry, paper science and microsystems technology. The Action's work centred on the impact of pulping, bleaching and beating on **nano- and microscale structure of paper fibres**.

The success of the Action may be measured by its growth during the four years from an original 12 signatories to 22, including three non-COST countries. Among the outstanding research results several findings can be mentioned, for example:

- The collection of new data on the fibre wall surface

layers composition and on fibre-to-fibre bonds peculiarities.

- The building of a **microrobotic platform** for studies of single fibres - possibly the first of its kind in Europe.
- Published new findings on the structure of the most abundant natural polymer, cellulose.

Above all, the Action achieved a high level of interdisciplinary networking and was a vital component of various new national and European projects. For example, in 2009, new ERA-Net project "Smartfibre" was launched with participants of this Action.

Chair of the Action: Prof. Arnis Treimanis (LV)

Vice Chair of the Action: Prof. Pasi Kallio (FI)

Duration of the Action: 2006 – 2010

Parties: Austria, Bulgaria, Finland, France, Germany, Hungary, Ireland, Israel, Italy, Latvia, Netherlands, Norway, Portugal, Romania, Slovenia, Spain, Sweden, Switzerland, United Kingdom (Total 19)
Non-COST institution participation from the CSIR-FFPRC (ZA) and the Petrozavodsk State University (RU).

Action website: <http://www.kki.lv/cost/> and <http://www.cost.eu/fps/Actions/E54>



Individuals, Societies, Cultures and Health (ISCH)

The ISCH Domain supports the development of knowledge and insights for citizens, democratic debate and decision-making in the public, private and voluntary spheres. The scope of the domain includes, for example, the development and behaviour of individuals and groups; social, economic, political, cultural, historical and technological structures and processes, and how these persist and/or change; cultural diversity and a common European future. Interdisciplinary topics linking social science/humanities perspectives with the natural, medical and engineering sciences are particularly welcomed by this Domain, provided that the social science/humanities aspect is predominant.

Domain website:
<http://www.cost.eu/isch>

Domain Committee Chair:
Dr Marc Caball

COST Office Science Officer:
Dr Julia Stamm
isch@cost.eu

ISCH running Actions





Open Scholarly Communities on the web

COST Action A32

The e-learning system unites research and education, and envisages the development and enhancement of critical thinking skills and of autonomous production of scientific contributions among graduate students and young researchers.

This Action was dedicated to creating a digital infrastructure for collaborative humanities research on the Web and an advanced e-learning system for graduate students and young researchers. And furthermore, to establish and foster the growth of Scholarly Communities which would provide feedback to the IT developers regarding the needs and expectations of humanities researchers and would serve as a core group of early adopters.

In summary, the Action has successfully:

- stimulated community developments through establishing exchanges about concepts and know-how among document-and-text-based humanities research platform projects Europe-wide in Philosophy, Literary Studies, History, Musicology;
- had thoroughgoing and widely effective success in facilitating digital data processing and infrastructural advances;
- has begun to show ways towards practical deployment of the 'web community' concept in e-learning applications;
- has investigated the Legal, Economic and Social Framework of scholarly communities.

As part of a more far-reaching strategy, the Action has successfully spawned a number of spin-off projects, e.g. Discovery-project (2006 to 2009 within the eContentplus programme). There are a number of further projects also expected.

Chair of the Action: Prof. Hans Walter Gabler (DE)

Vice Chair of the Action: Dirk van Hulle (BE)

Duration of the Action: 2006 – 2010

Parties: Belgium, Bulgaria, Cyprus, Denmark, Finland, France, Germany, Ireland, Israel, Italy, Norway, Romania, Serbia, Sweden, United

Kingdom (Total 15)

Non-COST institution participation from Networked Infrastructure for Nineteenth-century Electronic Scholarship (NINES) (US).

Action website: <http://www.cost-a32.eu/> and <http://www.cost.eu/isch/Actions/A32>

Cross-linguistically robust stages of children's linguistic performance

COST Action A33

Children with language-specific problems require a different kind of support from children with more general cognitive impairments.

This Action set out with the practical goal of helping European children with language impairments. One important way to help such children is to diagnose cases of language-specific impairment and normal non-verbal intelligence. Specifically, the Action proposed to provide recommendations for a design of an unbiased, trans-European language assessment tool.

The main successes of the Action are:

1. the launch of at least 10 associated new projects with funding from either national or European agencies;
2. of the more than 80 STSM missions funded by the Action, already three led to publications in international journals;
3. the two training schools and also many of the STSMs transferred much of the expert knowledge of the Action members to the next generation of researchers across Europe;





4. the recognition of specific language impairment in at least two European countries where the concept had not yet been recognised.

The **most important result** of this Action is a set of recommendations concerning linguistic properties along with suitable test methods, which can be used to develop cross-linguistic tests for language problems and language impairment in children at the age of school-entry. Because of this, a large number of European children have already received the support they need, regardless of whether their mother tongue is Basque or Finnish, Hebrew or Portuguese.

Chair of the Action: Dr Ulrich Sauerland (DE)
Vice Chair of the Action: Prof. Heather van der Lely (UK)

Duration of the Action: 2006 – 2010

Parties: Austria, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Israel, Italy, Lithuania, Malta, Netherlands, Norway, Poland, Portugal, Serbia, Slovak Republic, Spain, United Kingdom (Total 23)

Action website: <http://www.cost.eu/isch/Actions/A33>

Knowledge Management in Contemporary Europe

COST Event 2010

The ISCH Domain organised an Exploratory Workshop on the topic of “Knowledge Management in Contemporary Europe” which took place from 30 May to 1 June 2010 in Brussels.

At the Lisbon meeting in March 2000, the European Council expressed its wish for the European Union to become the most competitive and dynamic knowledge-based society in the world by the year 2010.

Lifelong learning (LLL) was identified as one of the key ways through which such a goal could be achieved. There was widespread consensus that ensuring easy access to good quality information and to learning is central to constructing a competitive, knowledge-based economy.

The challenge is defined by the entire field of knowledge management, comprising at the same time the production, dissemination and consumption of knowledge, ranging from preschool to the population at large.

The Aim of the Workshop:

The event gathered experts from Europe and beyond to discuss and set up an agenda of inspiring new ideas and proposals in the field of knowledge management. It aimed at advancing our understanding of how our societies can manage knowledge in the best possible fashion.

It did this by reviewing concepts, ideas, frameworks, problems and proposals regarding the field of

knowledge management, both from academic and practical approaches. Four working groups focused on dimensions of knowledge management:

1. the role of knowledge creation in a networked society;
2. knowledge infrastructures;
3. knowledge dissemination and transfer;
4. the future of higher education institutions.

The workshop adopted an interactive format. Plenary and working sessions were combined to allow general discussion as well as focused exchange. The group that came together in Brussels was an impressive mix of researchers in the early stages of their career and senior, well-established scientists. Philosophers, sociologists, and media specialists met with consultants and librarians, Europeans exchanged experiences and approaches with scholars from America and Asia.

The End Result:

At the end of the two-day workshop, each working group presented a set of well-defined problems, recommendations and strategies to be put forward to stakeholders and policy makers, to be applied for use in the field of educational decision-making. Two quality journal publications are currently underway which will disseminate the workshop’s results to a wide audience.

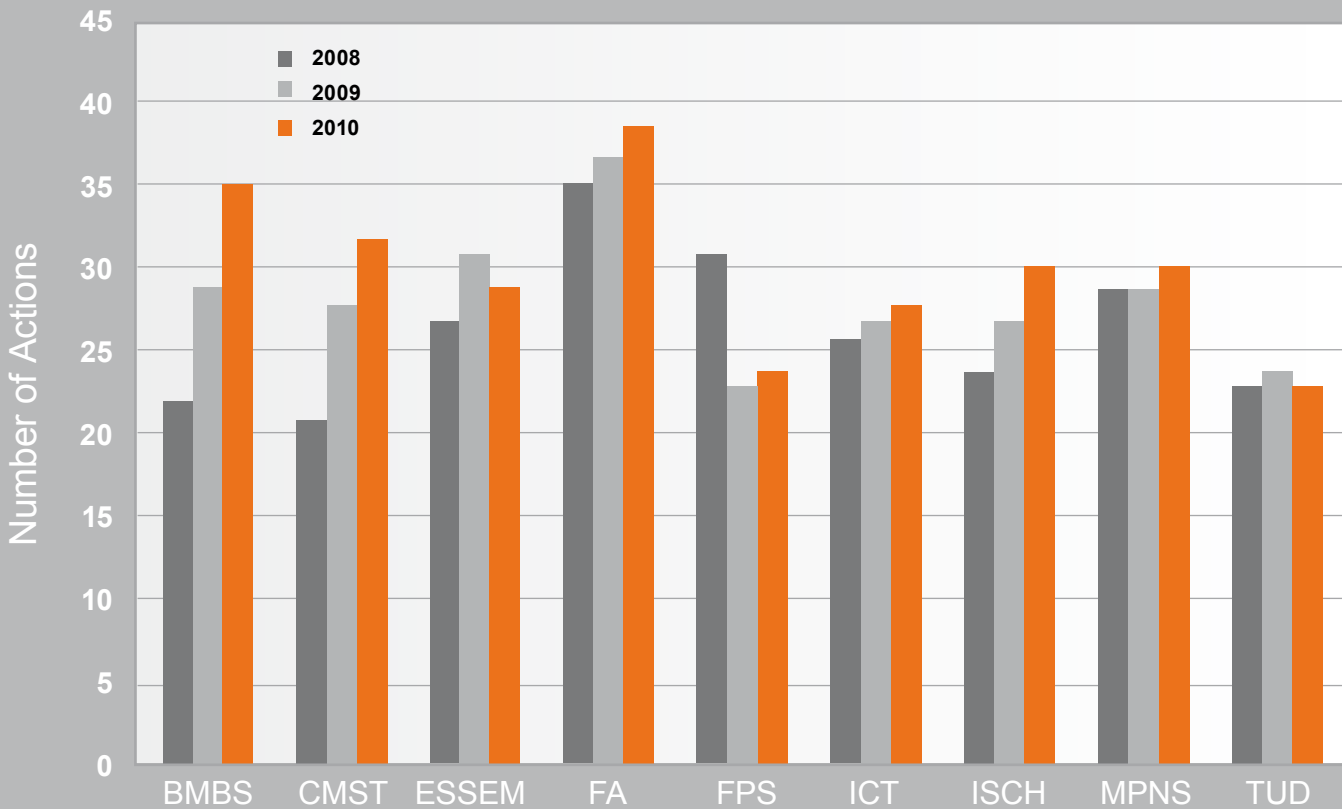
For further information on this event, including links to all the workshop presentations, please visit the COST site:

<http://www.cost.eu/events/knowledgemanagement>

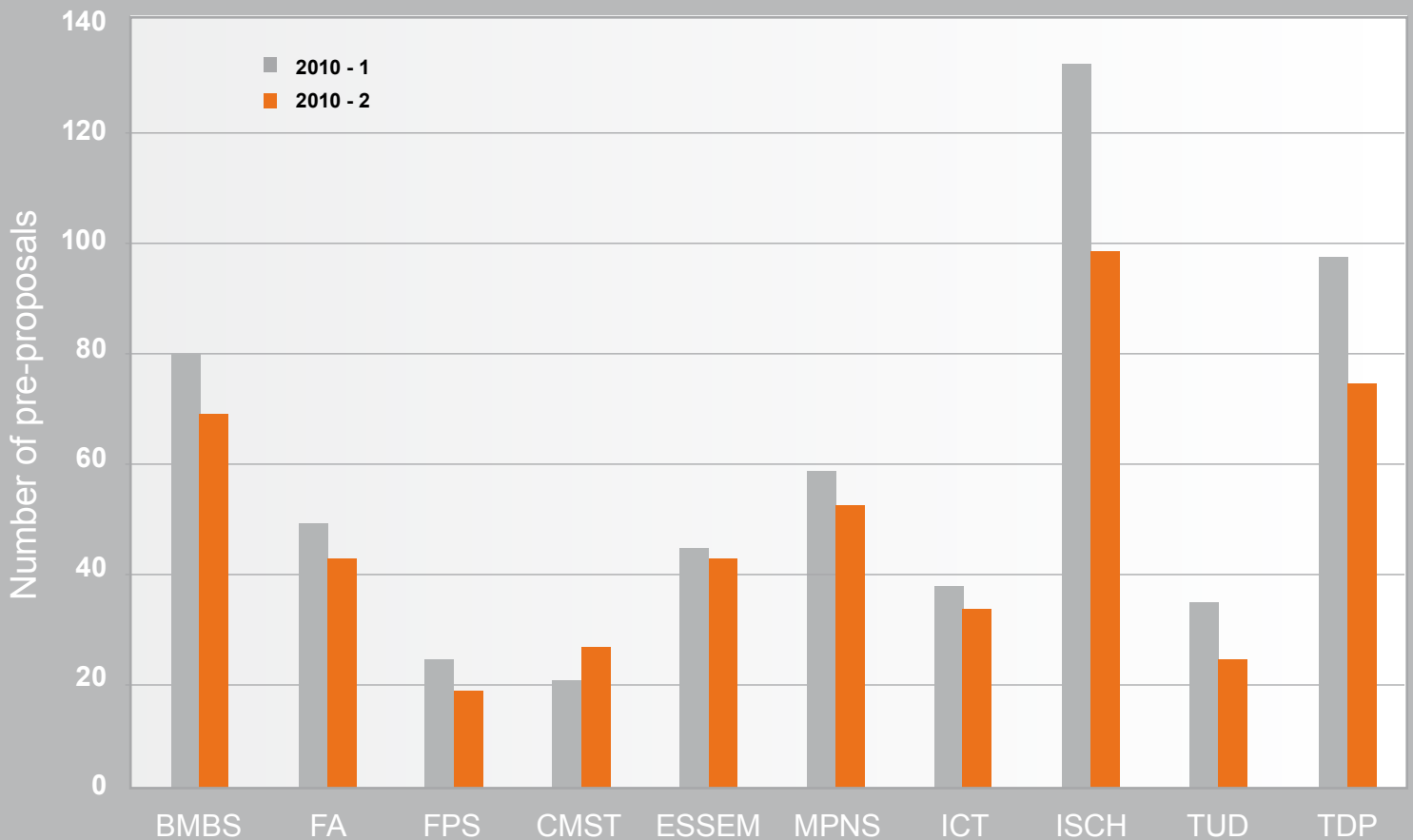
Domains evolve

To learn more about the activities per Domain, please visit http://www.cost.eu/domains_actions/

An overview since 2008



Number of pre-proposals in March and September 2010





Information and Communication Technologies (ICT)

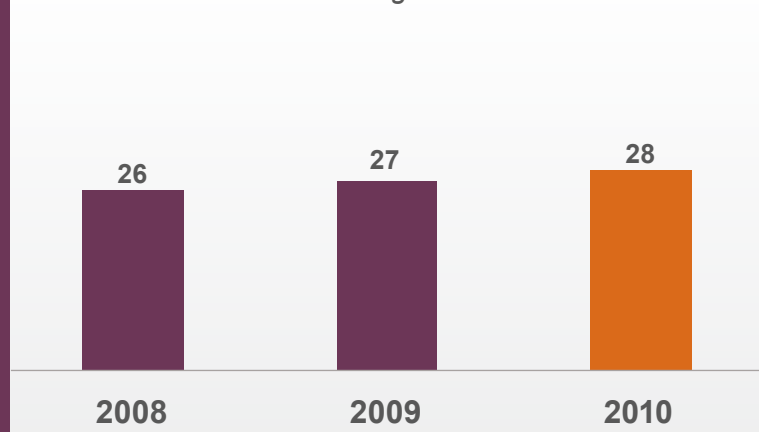
The ICT Domain covers scientific and technical research in all areas of information and communication science and technologies. The ICT research area is best summarised as treating the processing, transmission, storage, retrieval, management, usage, and exchange of information and knowledge, with emphasis on fundamental aspects and pre-competitive technology development.

Domain website:
<http://www.cost.eu/ict>

Domain Committee Chair:
 Prof. Soulla Louca

Current COST Office Science Officer:
 Dr Giuseppe Lugano
ict@cost.eu

ICT running Actions



Cross-Modal Analysis of Verbal and Non-verbal Communication

COST Action 2102

Emotional speech as well as facial expressions, gestures and gaze constitute the main form of non-verbal information that can be captured and analysed in a multisensory environment.

Human interaction happens via two channels. One conveys messages with a specific semantic content (verbal channel), while the other (non-verbal) conveys information related to both the image content of a message and to the general feeling and emotional state of the speaker. Fully understanding human face-to-face communication is needed in order to develop human-like interfaces allowing for friendly and intuitive human-machine interaction.

This Action aimed at developing an advanced acoustical, perceptual and psychological analysis of verbal and non-verbal communication signals originating in face-to-face interaction, with the ultimate goal of identifying algorithms and automatic procedures capable of recognizing human emotional states. The Action successfully:

- demonstrated the importance of multimodality (e.g. body-to-body communication) for the communication of emotional and social behaviour;
- demonstrated the importance of context for the communication of emotional and social behaviour;
- produced concrete examples of models and methods capable of analysing and simulating emotional and social behaviours;
- developed a clear and shared research agenda for human-machine interaction, evolving from pure interaction analysis to the study of cognitive and contextual aspects. This clearly reflected the state-of-the-art in research on affective computing, cognitive science, human-computer interaction, as well as in applications involving



humans (e.g. health, rehabilitation, learning and gaming);

- created a large and highly interdisciplinary network of experts spanning the social sciences and engineering (computer science, robotics, signal processing, psychology, sociology, linguistic, neuro-psychology);
- contributed significantly to reducing the fragmentation of research efforts in Europe and to the creation of a long-lasting community on cross-modal analysis of human communication.

The work carried out within the Action is instrumental for the development of technologies - such as emotional avatars, robots and cognitive aids - that will be central to coping with the societal challenges of the future (e.g. aging).

Publication 1:

Verbal and Nonverbal Features of Human-Human and Human-Machine Interaction

Publication 2:

Multimodal Signals: cognitive and Algorithmic Issues

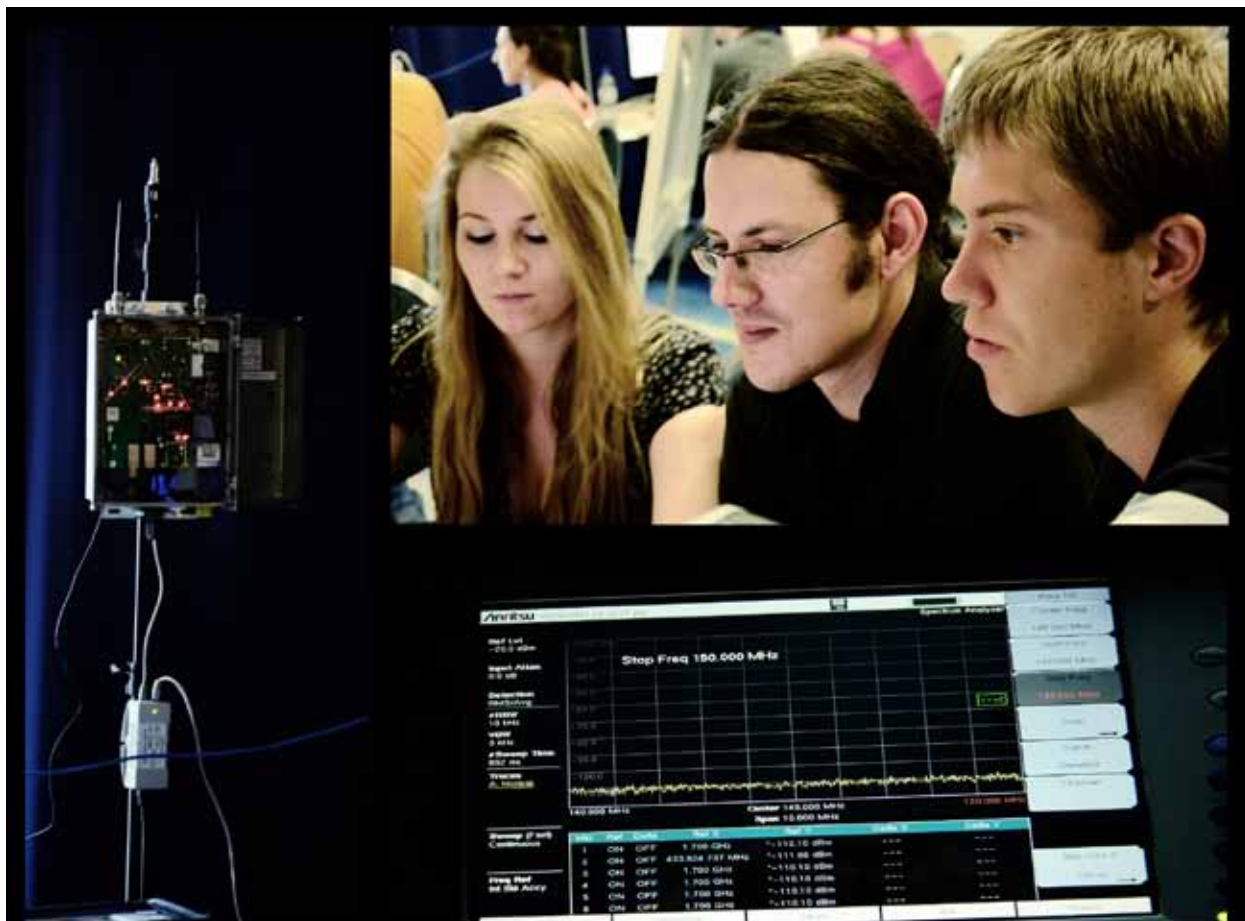
Chair of the Action: Prof. Anna Esposito (IT)

Vice Chair of the Action: Dr Amir Hussain (UK)

Duration of the Action: 2006 – 2010

Parties: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Netherlands, Norway, Poland, Portugal, Serbia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom (Total 28) Non-COST institution participation from the Ain Shams University, Faculty of Engineering (EG) and the College of Computer and Information Sciences, King Saud University (SA).

Action website: <http://cost2102.cs.stir.ac.uk/> and <http://www.cost.eu/ict/Actions/2102>





Materials, Physics and Nanosciences (MPNS)

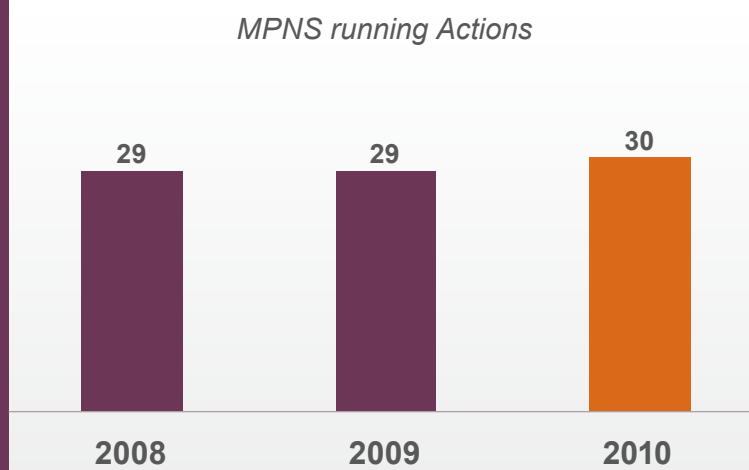
The MPNS Domain is home to material science, extending from conception through to production and includes characterization, examination, evaluation, fabrication and development, to actual application and service, as well as related databases, codes, standards and inspections. The Domain thus also incorporates nanomaterials and nanosciences and the nanotechnological applications thereof. It also supports exploratory basic and applied research in physics, theoretical and experimental, as a key to understanding the laws governing the behaviour of matter and energy.

Domain website:
<http://www.cost.eu/mpns>

Domain Committee Chair:
 Dr Anthony Flambard

COST Office Science Officer:
 Dr Caroline Whelan
mpns@cost.eu

MPNS running Actions



Photocatalytic technologies and novel nanosurfaces materials – critical issues (“PHONASUM”)

COST Action 540

The main objective of this Action was to increase the fundamental knowledge of nanocrystalline photocatalytically active materials and to develop new products utilising **self-sterilising and self-cleaning photoactive materials** for specific industrially relevant application fields such as self-cleaning and anti-microbial surfaces, water treatment, air purification and general hygienic applications.

The Action was successful in several ways.

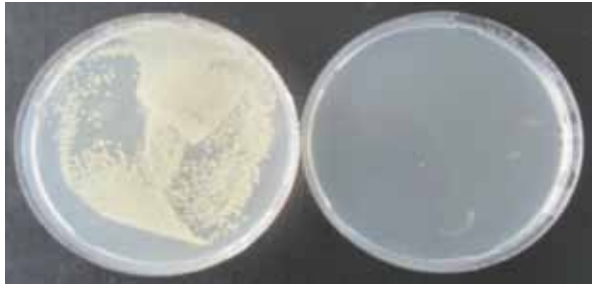
- The Action resulted in the development of novel highly active photocatalytic nanomaterials and coating systems with increased sensitivity in the

visible region of the solar spectrum, with high environmental stability and adaptability to various substrate systems.

- The Action successfully contributed to the establishment of the standard CEN TC 386 (the European Committee for Standardization) for photocatalysis.
- Representatives from 21 European Countries actively participated in this Action; several hundred scientists and stakeholders attended its Workshop and meetings, thus creating valuable opportunities for networking and knowledge transfer.
- The Action also benefitted from synergies and contacts developed by the European-Japanese Initiative on Photocatalytic Applications and Commercialisation (EJIPAC).
- The results of the Action were further disseminated through a number of peer-reviewed papers, a final comprehensive report and meeting proceedings.



The **most significant overall outcome** of this Action has been the groundwork it has laid for the future; the potential for significant improvement in the area of semiconductors for solar energy applications.



Chair of the Action: Prof. Detlef Bahnemann (IT)

Vice Chair of the Action: Dr John Colreavy (IE)

Duration of the Action: 2006 – 2010

Parties: Austria, Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Poland, Portugal, Romania, Serbia, Slovenia, Spain, Switzerland, United Kingdom (Total 20)

Action website: <http://www.cost540.com/> and <http://www.cost.eu/mpns/Actions/540>

Semi-solid Processing of Steels: Thixosteel

COST Action 541

When metallic alloys are part-solid and part-liquid, and with a particular kind of structure at the microscopic level, they behave thixotropically, i.e. if you shake them they become runny, if they are allowed to stand, they become thick again.

If you shear them, e.g. by pushing the semi-solid material into a mould, they flow smoothly with the viscosity of heavy machine oil, to fill the mould. The process is called 'thixoforming'.

The main objective of this Action was the development of an industrial-applicable process for the thixoforming of steel alloys.

Components created by thixoforming have many advantages:

- they require minimal machining operations, which saves money;
- they have fewer defects than conventional components;
- their materials have better mechanical properties – thinner, lighter but equally strong.

However, steel is not yet commercially processed by any of the routes which involve forming in the semi-solid state with the microstructure consisting of spheroids of solid in a liquid matrix. The main reasons for this are high working temperatures, oxidation and die degradation. If steel could be thixoformed there would be major advantages, for example, **saving raw material and achieving near net shape for complex** components in one shot.

The main results of this Action are:

- Over one hundred scientific papers have been written in connection with the project and two books (published under the auspices of COST) on 'Modelling Semi-Solid Processing' and 'Thixoforming Steel' have been widely distributed.
- Two highly successful Training Schools have been held and a whole range of companies have attended workshops to assess the technology.
- ESR STSMs were a particular focus of the Action, thus ensuring a continuing dedication to this project even after the Action has been completed.
- This Action played a major role in the 2008 International Conference on Semi-Solid Processing.

A **significant outcome** of this Action has been the mini symposium on semi-solid processing which was held as part of the annual ESAFORM conferences (ESAFORM is the European Society for promoting research in material forming) where the results from this project were presented under rigorous scientific review conditions.

Chair of the Action: Dr Ahmed Rassili (BE)

Vice Chair of the Action: Prof. Helen Atkinson (UK)

Duration of the Action: 2006 – 2011

Parties: Belgium, Cyprus, France, Germany, Ireland, Italy, Poland, Spain, Turkey, United Kingdom (Total 10)

Non-COST institution participation from the AI Akhawayn University (MA).

Action website: <http://www.cost541.ulg.ac.be/> and <http://www.cost.eu/mpns/Actions/541>



High Performance Energy Storages for Mobile and Stationary Applications: HPSMT

COST Action 542

Super-capacitors are intriguing energy storage devices, with the potential to absorb and release large amounts of energy at short notice over a lengthy lifespan.

The main scope of this Action was to improve high prospective super-capacitor technology and to tap the potential of super-capacitor based energy storage systems for mobile and stationary applications in Europe emerging from the enhancement of multidisciplinary and multinational cooperation.

There were many scientific and technical outcomes of this Action worth noting.

- It created new environmentally friendly separator materials.
- It developed an improved structure of electrode materials based on an asymmetric approach.
- It designed high performance energy storage systems for mobile and stationary applications based on **high voltage super-capacitors**.
- It provided solutions with increased reliable operation of super-capacitors within all the life cycle stages.
- It established strategic cooperation with industrial partners including developers, manufacturers and users – both OEM's (Original Equipment Manufacturer) and SMEs (Small and Medium Enterprises) - and actively used this cooperation to develop and test pilots and pilot operation projects both for transport and energy techniques.
- It raised the performance standards on a sectoral, national and European level and led to an enhanced realisation of the technology's potential.
- It established the ESR's (Early Stage Researcher) Think Tank and organised two Training Schools (partly in cooperation with other Actions of both the MNPS and the TUD Domain).
- It has been a major player in the establishment of the "European super-capacitor community"; it has been actively involved in two European symposia on super-capacitors and their applications; there have also been special dedicated meetings in conjunction with major European and world

international events such as IRES (International Renewable Energy Storage Conference and Exhibition), CESEP (International Conference on Carbons for Energy Storage), and Powereng (Power Design Delivery Conference).

- It contributed to the establishment of dedicated national research programs and centres of excellence as well as helped and facilitated a number of participants to secure funding both at a national and an EU level.

A **significant far-reaching** success of the Action has been the creation of a suitable and sustainable platform for a new Pan-European network, dedicated to the hybrid energy storage devices and systems for mobile and stationary applications, which inter alia will actively exploit the results of this Action.

Chair of the Action: Dr Dalik Sojref (DE)

Vice Chair of the Action: Dr Paul Nicolae Borza (RO)

Duration of the Action: 2006 – 2010

Parties: Belgium, Bulgaria, Czech Republic, Estonia, France, Germany, Greece, Ireland, Israel, Italy, Latvia, Lithuania, Netherlands, Poland, Portugal, Romania, Spain, United Kingdom (Total 18)

Non-COST institution participation from ECOND Ltd (RU), Mendeleev Russian University for Chemical Technology "MRChTU" (RU), Russian Railway Research Institute "VNIIZT" (RU) and the Scientific and Engineering Center for Energy Saving Processes and Equipment, "Joint Institute for High Temperatures - IVTAN", Russian Academy of Science (RU).

Action website: <http://www.wttc.de/cost/> and <http://www.cost.eu/mpns/Actions/542>

Advanced Paramagnetic Resonance Methods in Molecular Biophysics

COST Action P15

The aim of this Action was the initiation of a concerted European effort in the development of new electron paramagnetic resonance (EPR) instruments and methodologies and their applications in the field of structural biology.

While major instrumental developments in the last two decades have greatly enhanced the potential of the EPR techniques, these rapid technological



changes have also tremendously **widened the gap between EPR specialists and potential users.**

There was, therefore, a strong need to group different EPR laboratories working on biological systems together, in order to increase the access of potential users to different and leading EPR facilities. The Action has enjoyed several successes.

- The developments realised in the Action had important implications not only for the applications in biology, but for those in physics, material science, chemistry and medicine as well.
- The Action successfully gathered a large part of the European research groups working on biological EPR. The emphasis was put on integrating all members of these research groups in the network, rather than only the senior scientists.
- There were about 80 STSMs during the duration of the Action, which facilitated new collaborations leading to outstanding scientific results.
- The STSMs have also significantly increased participating researchers' ability to access the different EPR instrumentation.
- The Action has successfully ensured both the application, and the further expansion, of the technique, by focusing on training younger people in the rapidly changing technological aspects of EPR. Two large-scale summer schools and seven small-scale training schools were organised, which focused on different aspects of the EPR technique, its applications, and on the theoretical (quantum mechanical) modeling of EPR parameters.

Given that concerted actions around EPR facilities were launched in the US, it was important that such an effort would be done on a European level. The Action has successfully strengthened the position of Europe in the field of EPR spectroscopy and ensured that the European teams are in a leading position in this sector.

Chair of the Action: Prof. Sabine Van Doorslaer (BE)

Vice Chair of the Action: Dr Graham Smith (UK)

Duration of the Action: 2005 – 2010

Parties: Austria, Belgium, Croatia, Denmark, France, Germany, Greece, Hungary, Iceland, Israel, Italy, Netherlands, Norway, Poland, Portugal, Romania, Slovenia, Spain, Switzerland, United Kingdom (Total 20)

Non-COST institution participation from the Kazan Physical-Technical Institute of the Russian Academy

of Sciences (RU), the Laboratory of Nitrogen Compounds, Novosibirsk Institute of Organic Chemistry, Siberian Branch of Russian Academy of Sciences (SB RAS) (RU) and the University of Queensland, Centre for Magnetic Resonance (AU).

Action website: <http://www.cost.eu/mpns/Actions/P15>

Multiscale Modeling of Materials COST Action P19

Materials are among the main factors influencing human life. Even the eras of development of mankind have their name according to materials used and produced by the people at those times - the Stone Age, the Iron Age etc.

Multiscale modeling has recently emerged as an important tool in computational materials physics. The main scope of this Action was to increase the basic knowledge on technologically important materials and processes of their treatments, and to provide a scientific basis for improving their macroscopic properties.

The aim is to understand materials and the phenomena which occur within them, on all the possible time and length scales; **from the atomic level** (described using quantum mechanics) **to their macroscopic properties.**

This Action has been a great success.

- New methods have been developed and also adapted by scientists working on other fields.
- Quantum mechanical *ab initio* methods have been introduced in the micromagnetism calculations and to the calculation of phase diagrams in the CALPHAD (Computer Coupling of Phase Diagrams and Thermochemistry) community.
- The emphasis of the Action has been on 'hard' materials, however, one of the working groups concentrated on the soft materials, thus providing an important link with other Actions working on that area.
- The training of ESRs has always been a focus of the Action. Most of the STSMs were performed by young scientists and have resulted in many peer-reviewed publications and new research



projects. A number of training schools have been organised; some have been interdisciplinary in nature, co-organised with the members of Actions 540 and 543.

- The Action helped a number of participants to secure national and EU research funding.
- The Action supported several workshops and conferences - some of the working group and other meetings were organised in the context of major international meetings. This gave the Action members an opportunity to network and share knowledge, as well as the opportunity to increase the visibility of this Action's work.

Multiscale modeling of materials is an evolving field and the work of the Action has by no means finished. Even though no direct follow-up has been established, the collaboration on the field will continue, which is of extreme importance to the continued success of this Action. The work of this Action will result in new COST Actions and other EU projects.

Chair of the Action: Prof. Matti Alatalo (FI)
Vice Chair of the Action: Prof. Mojmir Sob (CZ)
Duration of the Action: 2006 – 2010
Parties: Austria, Belgium, Bulgaria, Czech Republic, Finland, France, Germany, Greece, Hungary, Israel, Lithuania, Norway, Poland, Portugal, Spain, Sweden, Switzerland, United Kingdom (Total 18)
 Non-COST institution participation from the AUT University (NZ).
Action website: <http://www.ipm.cz/costp19/> and <http://www.cost.eu/mpns/Actions/P19>

Large-Eddy Simulation for Advanced Industrial Design (“LES-AID”) COST Action P20

Publication 1:
 LES and DNS of Ignition Processes and Complex-Structure Flames with Local Extinction
 Publication 2:
 Direct and Large-Eddy Simulation VII

This Action aimed to develop large-eddy simulation strategies for turbulent flows in industrial applications involving combustion, external/internal flows and

multi-phase fluids. A central focus of LESAID is the development of **Best Practice Advice for Large-Eddy Simulation (BPAL)** applicable to turbulent flows in realistic applications in science and technology.

There are several notable outcomes of this Action.

- A large number of STSMs facilitated the transfer of knowledge among various research groups and, in many cases, also led to joint research papers which were presented to journals and included in workshop proceedings. These STSMs also contributed to the exchange of research tools and methods between researchers.
- A variety of workshops, training schools and STSMs were organised, often in conjunction with a larger international conference or workshop.
- The STSMs were important tools for stimulating collaboration and interdisciplinary cooperation.
- The Action contributed to five workshop proceedings, which were published by Springer (Springer Science + Business Media) and by APS Journals (APS).
- The Best Practice Initiative for LES is now being embedded into the ERCOFTAC (European Research Community on Flow, Turbulence and Combustion) organisation and further connected to similar activities within ASME (American Society for Mechanical Engineers).

The **main outcome** of this Action resulted in the basis for best practice advice for large-eddy simulation (BPAL). This has the potential to strengthen CFD (Computational Fluid Dynamics) of turbulent flow in European industry.

Chair of the Action: Prof. Bernard Geurts (NL)
Vice Chair of the Action: Prof. Andrzej Boguslawski (PL)
Duration of the Action: 2006 – 2010
Parties: Belgium, Cyprus, Czech Republic, Denmark, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Italy, Netherlands, Poland, Spain, Sweden, Switzerland, United Kingdom (Total 16)
 Non-COST institution participation from the Los Alamos National Laboratory (US), NASA Glenn Research Center (US), Seoul National University (KR), Space Research Institute of the Russian Academy of Sciences (RU), University of Maryland, Glen L. Martin Institute of Technology, Department of Mechanical Engineering (US), University of Southern California (US), Worcester Polytechnic Institute (US).



Action website: <http://lesaid.math.utwente.nl/> and <http://www.cost.eu/mpns/Actions/P20>

Physics of droplets

COST Action P21

A droplet of liquid is the smallest fluid entity that a microfluidic physicist has to deal with. A droplet may be considered as a fluid transport cell or even as a chemical micro-reactor.

The main objective of this Action was to unify and coordinate efforts aimed at studying the physics of droplets, from microscopic scale to our macroscopic world, without neglecting the broad applications.

Fundamental questions were addressed within this Action. For example, how droplets stick/move onto a surface, how two droplets mix together, how to manipulate them. Essentially, the internal and the surrounding **micro-flows** have to be well understood.

This Action has many noteworthy breakthroughs.

- Innovative knowledge was produced, not only in the physics of droplets, but also in the physics of thin films and foams.
- Scientific breakthroughs included the controlled deposition of droplets and their manipulation using vibrations, electro-wetting and capillary effects.
- Further scientific advances include an improved understanding of drop break-up and drop-drop coalescence processes, drop manipulation, electro-wetting, foam stabilisation by anisotropic particles and the development of foam barriers against blast waves.
- The interdisciplinary nature of the Action has created an efficient network of researchers from different backgrounds – about 200 researchers have participated in this Action.

- The various STSMs and ESR opportunities created within this Action have successfully unified European efforts for studying droplets.
- These new collaborations have resulted in many scientific articles being published in peer-reviewed international journals.
- Most of the workshops in the Action were organised in conjunction with major EU/world international conferences such as the ESA's (European Space Agency) "Eufoam" and the "Bubble & Drop Interfaces" conferences.
- Collaborations with other actions and organisation in EU were also strong, including COST Action D43.
- The future strategy to continue the activities within this Action has also been established; including Marie-Curie ITN networking; bilateral/multi-lateral exchange visits; continuing Workshops; applications for future Actions, in particular the proposal for a new Action entitled "Smart and Green Interfaces : from single bubbles/drops to industrial/environmental/biomedical applications".

Before this Action, there were many laboratories in Europe performing research on droplets. This Action's main success has been its facilitation in unifying European research efforts in this field. The Action has also allowed collaboration between teams of researchers from different fields.

Chair of the Action: Prof. Nicolas Vandewalle (BE)

Vice Chair of the Action: Dr Michele Adler (FR)

Duration of the Action: 2006 – 2010

Parties: Austria, Belgium, Bulgaria, France, Germany, Greece, Ireland, Israel, Italy, Netherlands, Norway, Poland, Romania, Slovenia, Spain, Switzerland, United Kingdom (Total 17)

Non-COST institution participation from the Ian Wark Research Institute, University of South Australia (AU).

Action website: <http://www.costp21.ulg.ac.be/> and <http://www.cost.eu/mpns/Actions/P21>



Transport and Urban Development (TUD)

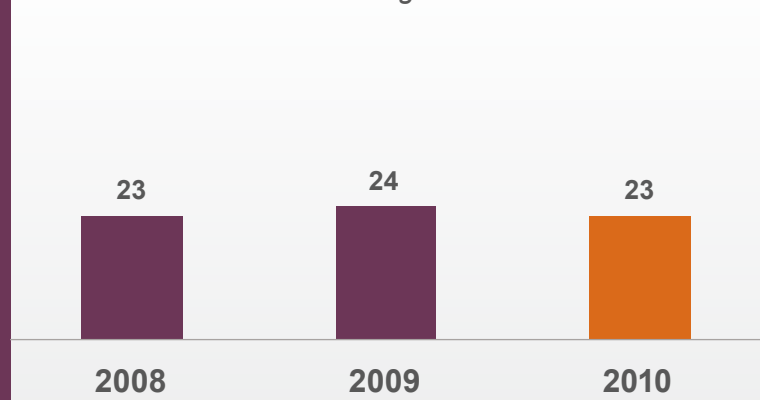
The TUD Domain fosters research coordination in the fields of transport and the built environment, which play a strategic role in the modern society and economy. It aims at fostering international research networking activities between scientists and experts dealing with transport systems and infrastructures, urban land use and development, architecture and design, and civil engineering issues. The Domain is by definition cross-sectoral and multidisciplinary, encompassing a wide range of scientific expertise within the transport and land use planning, design and management activities. It emphasizes the strong interrelationships among the relevant policy fields as well on all aspects related to sustainable development.

Domain website:
<http://www.cost.eu/tud>

Domain Committee Chair:
 Prof. Cristina Pronello

COST Office Science Officer:
 Dr Thierry Goger
tud@cost.eu

TUD running Actions



Towards the definition of a measurable environmentally sustainable transport (EST)

COST Action 356

Publication:
 Indicators of Environmental Sustainability in Transport: An interdisciplinary approach to methods

The Action has aimed to contribute to the development of methods to efficiently integrate complex environmental issues into the assessment and decision processes in transport planning and policy. The main objective has been to design harmonised methods to build better environmental impact

indicators based on the existing knowledge, and to explore how to integrate these indicators into decision-making processes.

The key successful elements of this Action have been:

- the **systematisation of environmental impacts of transport**, in the form of a “chains-of-causality” approach;
- the establishment of procedures for the assessment and selection of individual indicators;
- the introduction of methods for joint consideration of indicators through aggregation or multi-criteria analysis;
- an increased collaboration among scientists specialising in environmental impacts (‘natural’ scientists), in decision making processes (‘policy’ scientists) and in transport and environment planning (‘planning’ scientists);



This Action has been particularly successful and should be useful for:

- selecting and building indicators and especially environmental impact indicators for transport;
- providing support to the identification of problem, monitoring, planning, decision making, evaluation, or benchmarking of transport policies, plans, programmes, projects, or transport technologies.

The Action has thus contributed to new knowledge with regards to how the **environmental impacts of transport can be measured**; how these measurements can be transformed into operational indicators; how several indicators can be jointly considered; and how these indicators are used in planning and decision making.

The **main output** of the Action was the final report of the Action entitled “Indicators of environmental sustainability in transport: An interdisciplinary approach to methods.”

Chair of the Action: Dr Robert Joumard (FR)

Vice Chair of the Action: Dr Henrik Gudmundsson (DK)

Duration of the Action: 2006 – 2010

Parties: Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, France, Germany, Greece, Hungary, Italy, Latvia, Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland, United Kingdom (Total 20)

Non-COST institution participation from the Faculte des Sciences de l’Ingenieur, Universite de Blidawas (DZ).

Action website: <http://cost356.inrets.fr/> and <http://www.cost.eu/tud/Actions/356>

Pedestrians’ Quality Needs (PQN)

COST Action 358

Publication:

COST 358 – Pedestrians’ Quality Needs Final Report.

The main objective of this Action was to provide an essential contribution to systems knowledge of pedestrians’ quality needs and the requirements

stemming from those needs, thus stimulating **structural and functional interventions**, policy making and regulation to support walking conditions throughout the EU and other involved countries.

This Action had a number of targets, all of which were successfully reached:

1. Improve the understanding of pedestrians’ quality needs, thus developing an essential tool for the stakeholders to implement better conditions for walking and pedestrians’ quality of life.
2. Describe the state-of-the-art, identify an agreed set of requirements and develop a new paradigm that can be used by stakeholders for analysing and improving reality.
3. Provide an accessible knowledge base and easy to use auditing scheme that enables authorities and possibly interest groups to tackle, prevent and prioritise current and future problems regarding pedestrian mobility and presence in public space.
4. Stimulate partners to create tools and to disseminate knowledge that helps in shedding new light on the issue and stimulates a new spirit in providing for safe mobility of the pedestrian.
5. Provide recommendations for further research.

The main results of this Action were presented at the Walk21 Conference in The Hague (the 11th International Walk21 Conference and 23rd International Workshop of the International Co-operation on Theories and Concepts in Traffic safety).

The **overriding success** of this Action has been this presentation of the PQN final results and recommendations for action to national governments, local and regional authorities, practitioners and Non-Governmental Organisations (NGOs). The group also formulated a number of key messages for policy development.

Chair of the Action: Mr Rob Methorst (NL)

Vice Chair of the Action: Mr Jim Walker (UK)

Duration of the Action: 2006 – 2010

Parties: Austria, Belgium, Czech Republic, Estonia, Finland, France, Germany, Greece, Hungary, Israel, Italy, Netherlands, Norway, Poland, Portugal, Serbia, Spain, Sweden, Switzerland, United Kingdom (Total 20)

Action website: <http://www.walkeurope.org/> and <http://www.cost.eu/Actions/358>



Urban Habitat Constructions under Catastrophic Events

COST Action 356

The catastrophic events, both natural and man-made, continuously hit the built heritage in urban habitats, producing dramatic effects around the World. Each catastrophe, depending on its physical nature, produces different types of damage on constructions, which can lead to the structural failure.

The main objective of this Action was to increase the knowledge on the behaviour of constructions located in urban habitats and subjected to both natural and/or man-made catastrophic events (such as earthquakes, fire, wind storms, heavy snow loading, gas explosions, accidental impact from vehicles out of control and occasionally due to bomb blasts during terrorist attacks).

A very serious problem interesting all the human being is to find solutions for preventing, or at least mitigating, this kind of damage by **adequately protecting the constructions** and, in case the damage arises, by repairing the damaged construction and making them able to resist further injuries due to catastrophic events.

The scientific challenge here concerns the setting-up a general methodology for protecting the built heritage from the damage produced by catastrophic events. The Action was successful in addressing these challenges.

- Suitable tools have been selected for the **prediction of the ultimate response** of such constructions under extreme conditions, occurring when both loading and structural resistance are combined in such a way to reduce the safety level below acceptable values.
- Ad-hoc provisions for damage prevention as well as for repairing the constructions hit by the extreme actions due to catastrophic events.
- The Action's scientific missions were a particular success, facilitating a strict and fruitful inter-cooperation among academic, governmental and public institutions and generating an important tangible social impact.
- An enlarged forum of specialist in different fields

(geologists, geophysicians, volcanologists, seismologists, architects and structural engineers) has been created.

- Many short term scientific missions were organised thus giving young Early Stage Researchers unique experience in the field.
- This Action provided many European experts with the possibility of future collaborations as well as the opportunity to interact with public authorities.

Publication 1:

Urban Habitat Constructions under Catastrophic Events

Publication 2:

Urban Habitat Constructions Under Catastrophic Events - Final Report

The **main achievement** of the Action was the development of a general methodology for the risk assessment in case of simple or complex scenarios of catastrophic events

Chair of the Action: Prof. Federico Mazzolani (IT)

Vice Chair of the Action: Prof. Euripidis Mistakidis (EL)

Duration of the Action: 2006 – 2010

Parties: Austria, Belgium, Cyprus, Czech Republic, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Italy, Lithuania, Malta, Netherlands, Poland, Portugal, Romania, Slovenia, Sweden, Switzerland, Turkey, United Kingdom (Total 22)

Action website: <http://www.civ.uth.gr/cost-c26/> and <http://www.cost.eu/tud/Actions/C26>



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<http://www.cost.eu>



BMBS Biomedicine and Molecular Biosciences



CMST Chemistry and Molecular Sciences and Technologies



ESSEM Earth System Science and Environmental Management



FA Food and Agriculture



FPS Forests, their Products and Services



ISCH Individuals, Societies, Cultures and Health



ICT Information and Communication Technologies



MPNS Materials, Physics and Nanosciences



TUD Transport and Urban Development

cooper
ing schools
scientific missions
strategic workshops
human potential